RAILROAD GAZETTE

FRIDAY, APRIL 8, 1898.

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Contributions.

Mixing Phosphor Bronze.

Montreal, March 28, 1898.

To the Editor of the Railroad Gazette:

I have read with much interest the article by your correspondent "Micro" in the issue of the 25th inst., and shall be much obliged if "Micro" would kindly say what flux he used in mixing or remelting phosphor bronze. R. A.

In answer to the inquiry relative to the flux used in mixing and remelting the phosphor bronze as I described in your issue of March 25, I would say that no flux whatever was used. The only precaution taken to prevent oxidation and loss was to cover the surface of the metal with charcoal while pouring.

MICRO.

Tests of Bearing Metals.

To the Editor of the Railroad Gazette:

The article on tests of phosphor bronze bearing metals, page 212, is very interesting and is made especially so to those engaged in the manufacture of this metal by the exhaustive trials of re-smelting and the losses of its constituents in doing so. The fact of its becoming so hard at the tenth heat that it could hardly be touched by the file is noteworthy, especially as the proportion in the first smelting of copper and tin, 7.94, and that of the tenth, 7.73, is so nearly alike that the change in the metal must be wholly due to the crystallization of the same through the agency of the phosphorus. I have no further comments or remarks to make as the subject in question is so exhaustively treated by "Micro" that there is nothing left to add.

We are making phosphor bronze with a phosphor copper of 7.758 per cent. of phosphorus and 92.242 per cent. copper (our own making). We make in quantities of 265 lbs. at a time with a loss of phosphorus of 2.95 per cent., which we consider comparatively small. METAL.

The Massachusetts Snowstorm.

Boston, March 31, 1898.

To the Editor of the Railroad Gazette:

Will you kindly correct an error which your printer has made in my article on the February snowstorm, published in your issue of March 25. I said that when block signals were disabled, flagmen put on to fill the gap could not fill the place of the signals, though they did diminish the chance of accident; as the article is printed, I am made to say that they do not diminish the chance of accident. This, of course, is a decidedly left-handed compliment to the flagmen, and I do not wish to even seem to be unmindful of their valuable service in the storm referred to. More faithful and conscientious work was never done than by some of our railroad employees on that occasion. It remains true, however, that no matter how faithful the man, he cannot do the work of the machine, and therefore a restoration of normal conditions at the earliest possible moment is highly important.

GEO. W. BLODGETT.

The Height of Drawbars.

Washington, March 31, 1898.

To the Editor of the Railroad Gazette:

I would like to speak of an article in the editorial columns of your issue of March 25th. No railroads are now being "annoyed" by notices from the Interstate Commerce Commission that cars have been found by its inspectors which do not conform to the prescribed drawbar height, because there has been no letter or communication on the subject written since last October, nor have any cars been inspected since about the same time.

The inspector of the Commission has never yet chosen the position upon the tracks that a car should occupy to be inspected. Opportunity has always been given to the person in charge to place cars in any position they might desire, and in regard to the conclusion that more care should be taken in measuring the height of cars, no cars have been measured by the Commission where the utmost care was not taken, and that by a practical man, and with the full knowledge of the railroad company on whose tracks the cars were found. Regarding the question of variation in height, the standard height and variation were fixed by the American Railway Association, under express provision in the law. If three inches variation is not enough, it is the fault of that Association, and not the fault of the Commission or any representative of it.

What has been done is simply to call the attention of railroad presidents to variations found and leaving the matter with them to investigate. E.

The Gas Engine and its Mission.

Yorkshire College,
Leeds, March 23, 1898.

To the Editor of the Railroad Gazette:

I have read with much interest the articles you have recently published on the gas engine and its mission. While there is much in Mr. Reeves' articles that will readily be agreed to, yet I am of the opinion that the trend of the articles is misleading. Mr. Reeves takes the Belfast installation as an example of the best practice in this country in gas engineering. As this installation has been considerably remodeled since the tests quoted, I do not think that it should be regarded as an installation by which comparisons may be made. Nor would it be just to conclude that because this plant may not have succeeded from the point of economy, no other plant is capable of doing better.

One would gather from the matter which has appeared in your columns that the gas motor is more inefficient than the steam engine. Now, as you are aware, and I do not doubt that the writer of the articles is quite aware, the thermal efficiency of the average gas engine is quite twice that of the average steam engine. I do not, of course, dispute that the actual cost of fuel per I. H. P. may run out to more in the case of some gas engines worked by ordinary lighting gas. But surely it is misleading to state that the engine is inefficient because people continue to use a form of fuel which is itself expensive to manufacture and deliver. In drawing his conclusions, the writer of the articles entirely neglects the cost in wages to run a steam plant. The mere cost of fuel to a small user is insignificant compared to the wage sheet, and it therefore pays over and over again to drive a small gas engine from existing gas mains, so that one may avoid the expense of constant attention. I prefer, therefore, to state the case for the gas engine thus: That the gas engine has spread in use because it is thermally the most efficient engine on the market and in very many cases the most convenient; but it has not spread as rapidly as it might have done, had the source of power for small users been as cheap as it is convenient.

Regarding the starting of gas engines, there may be room for some improvement; though in this connection it is often forgotten that a large mill engine is invariably provided with its turning engine. There is no reason why a large gas engine should not be provided with a smaller engine suitable for turning.

Some mention was also made of the desirability of making the valves in a gas engine entirely automatic. I do not think that automatic valves will find favor amongst practical men in this country. The action of such valves is not as rapid as when positively driven, and this entails a reduction of pressure during the suction strokes and the possibility of escape during the commencement of the compression stroke. In the best air compressors positive action valves are always used, and may not the gas engine during half its life be considered to be performing the function of an air compressor?

FREDERICK GROVER.

Insufficiency of the Standard Flagging Rules.

New York, April 4, 1898.

To the Editor of the Railroad Gazette:

During the past week a problem has been placed before us which may be of interest to the American Railway Association as affecting the rules promulgated by it relative to flagging. A certain railroad has a station situated at the foot of descending grades in both directions, the grade for east bound trains being heavier than in the opposite direction. It is the practice for an east bound train, after having stopped at the station, to back up and make a run for the opposing grade. We were asked if an automatic signal could not be put in at some distance west of the station, controlled by a push button at the station, which would permit the operator to throw it to danger behind the train by pressing the button and permitting east bound trains to back westward without sending out a flagman. We held that under the rules of the American Railway Association this could not be done, and to confirm our opinion we addressed a letter to a well-known operating man and received the foloiwng reply:

In my opinion, it is not only bad practice and contrary to the standard code for a train to back up in the manner you describe, but it is also such to even stand on the main track without sending out flagmen. Rule 399, Standard Code, reads: "When a train stops or is delayed under circumstances in which it may be overtaken by a following train, the flagman must go back immediately with danger signals a sufficient distance to insure full protection, etc." Again, under head of Telegraph Block System, rules for enginemen and trainmen, rule 531 reads: "Block signals, unless otherwise provided, do not affect the rights of trains under the time table or train rules." Rule 532: "Block signals do not dispense with the use or observance of other signals whenever or wherever they may be required." These same rules are repeated under the head of controlled manual block and automatic block systems. It is an unwritten law of railroads that a train which has passed over a certain portion of the road under its train rule and time card rights has no right whatever to move back in the opposite direction from which it was running. In order to cover this point so that in case a freight train breaks down where it might save a delay to other trains in clearing the main track, after able to move, the following clause was added in our book of rules: "When it is necessary to move a train backward between stations a flagman with danger signals must be sent out not less than 30 telegraph poles in the direction in which the train is to be backed from rear of the train. The speed of the train must not exceed four miles per hour and the conductor must be stationed at the rear end of the last car in position to enable him to see the first sign of danger so as to signal the engineman and stop the train if necessary."

Faith is a good thing in its place, but practical railroad men, such as those of the American Railway Association, who formulated the standard code, have not, up to this time, had sufficient faith in appliances to be operated automatically or through human agency to hold a train so that it is deemed safe to depend entirely upon such protection to take the place of the flagman.

The only scheme which we know of that should permit a train to move back in a block section without sending out flagman is the electric train staff. With this the engineman having a train staff, which is virtually an order to move in either direction within the block controlled by that train staff, can go any distance desired east bound and reverse the movement as often as he pleases with absolute safety, for the reason that no opposing orders can be given, and, consequently, no trains can get into the block from either end unless they go by the signal at danger and enter the block without an order; and, if it is considered that trains might enter a block without an order and against an absolute stop signal, the system may be further enlarged by introducing the physical protection of the derail operated in connection with the signal. This is not, however, considered necessary; consequently we say a train having with it the train staff is absolutely protected.

We submitted our opinion to another well known operating official, and his reply as follows confirms it:

"I agree with you that when the electric train staff system is in use it is practicable to run trains that hold the staff in either direction on single track. This is our practice on the Savannah bridge block when there is necessity for it, such as ballast trains, pile drivers or work trains of any description. It is also the English practice and is provided for in the rules relating to staff workings."

Unless our position is not sustained by the opinion of the Association and the results of actual practice it would seem that some modification might and should be made in the rules of the Association.

In considering the problem first mentioned, and supposing the train staff block was in operation, the east bound train could hold its staff received from the station in the rear, and having performed its work at the station at the foot of the grade before mentioned, could back westward as far as desired, and deliver the staff at the bottom of the grade and receive the staff for the section ahead as it passed the station; consequently, no automatic signal would be required nor would flagman have to be sent out.

Since the train staff absolutely controls all switches in a given block, and permits trains to work in that block in either direction without train orders and without sending out flagman, it will be seen that it is the most complete method of controlling traffic on a single track line.

Where a single track line is used by several companies the employees of these companies are not required to be examined on the rules if the track over which their trains operate is controlled by the staff system, and, consequently, no explanations or special bulletins are issued; all that the engineman needs to know is that he cannot get a clear signal unless the train staff is ready for him and no misinterpretation of orders can occur, because none are issued.

The volume of traffic which can be moved over a single track controlled by the train staff is greatly in excess of the amount where no train staff is used, because considerable time is often required for the passage of trains, and it is not infrequently the case

that trains lie at a passing track, junction or station for several hours when there is no physical necessity for it.

THE NATIONAL SWITCH & SIGNAL CO.,
Charles Hansel, Vice-President.

Unnecessary Labor in Locomotive Details.

At the meeting of the New England Railroad Club on Tuesday, April 12, a paper, bearing the above title, by Mr. P. M. Hammett, Master Mechanic Boston & Maine Railroad, was read. The major part of the paper is printed below, omitting the preliminary remarks about external finish.

Passing on to the structure of the locomotive, we observe that intelligent application to the design of details in the drawing room will invariably be well repaid by reduction in the cost of maintenance. No mechanical structure is subjected to so excessive and rapid wear as the locomotive, and since the new engine is erected but once, yet must be torn apart and rebuilt a dozen times in its life, it is evident that, in the original design, the question of economical maintenance is of even greater moment than that of low first cost. Many cases in point will occur to you, of which I may quote a few:

Smoke boxes and extension fronts should be made of separate sheets, to facilitate the renewal of the extensions, which are the more perishable. Spring hangers and equalizers should be so proportioned as to allow ample room for adjustment of hangers as the springs grow weak in service. Care should also be taken to make the spring rigging easily accessible, so that springs may be changed without needless labor.

On large engines, having the springs below the driving boxes, labor may be saved by leaving an opening in the inside face of the oil cellar, closed by a removable plate, through which the sponging may be renewed without removing the cellar.

In designing the attachments of cylinders, frames and foot plates, it is labor well spent to avoid the use of tap bolts or studs. Whenever a solid connection is needed it can best be assured by the use of taper bolts in reamed holes. Countersunk heads on bolts should also be avoided, as they increase the difficulty and cost of making good fits.

The increasing use of driving wheel tires 3½ in. and 4 in. thick, which, before renewal, are reduced to 1½ in. or less in thickness, renders it desirable to make ample provision, both in engine truck and tender, for adjustment of height to suit the change in height from rail to center of driving axle. Pilots, too, should be easily adjustable, that their height from the rail may be kept constant.

Driver brakes are now universally applied; so far as I am aware, except in New England, the driver brake shoes are still secured to the heads by bolts with countersunk heads, and their renewal is very laborious. A modification of the well-known Christie key attachment is now in use on several roads, with entirely satisfactory results.

The use of large steam pipes and high steam pressures has led to better designs for the attachment of smokebox steam pipes, with good results in strength and durability. A point sometimes overlooked is the joint between the dry pipe collar and front flue sheet. If this collar be riveted to the dry pipe, and the latter be offset so that it cannot be rotated when in place, this joint can only be reground by cutting off the collar. In such a case a loose joint ring between flue sheets and collar would greatly facilitate repairs.

The bolts or studs securing steam and exhaust pipes to cylinder saddles are generally so affected by heat that they cannot be unscrewed. The labor of cutting them off and the risk of breaking the lugs through which they pass may be escaped by making the bolts with heads of exaggerated length, upon which a stout wrench may obtain a sufficient hold to twist the bolts off. Labor is saved, and other substantial advantages are gained, by the use of a combination stand on the boiler, for injectors, air pumps, blower and other subsidiary purposes.

The built-up type of steam piston has now, on many roads, given place to the piston in one piece, with cast iron packing rings sprung into grooves. Whether of box form, in cast or malleable iron, or of any of the simple plate forms, in cast or forged steel, this piston is much the cheaper in first cost and maintenance.

Metallic packing for piston rods and valve stems is almost universal, and few would willingly abandon its use. Of its economy there is little room for doubt. Yet in spite of the good results obtained with either of the types most largely used on locomotives, it is a fact that there is much room for improvement. The average life of these packings, in actual service, is far below what is to be desired.

Skillful design implies careful selection of material; equally does it imply consideration of the character of the material and the process by which it must be brought to form, in determining the shape to be given it. For complicated forms a metal which can be cast is to be preferred to one which must be forged, if the needed physical qualities can be guaranteed in the casting.

The steady improvement in the quality of steel castings has already led to their use in many places, and there is prospect that we shall soon be offered steel castings which will be sound, tough, and low enough in carbon to make welding generally practicable. With the assurance of such qualities we may look forward to the substitution of engine frames cast in one piece of steel for the time-honored forged iron frames with many welds. The use of frames of a metal which affords so great freedom in choice of form will in time probably lead to considerable deviations from the traditional forms, and I fancy that before long we shall see engine frames bearing comparatively little resemblance to those of to-day, and much better adapted to the severe strains to which they are subjected.

Steel castings are much used in the place of iron castings, to save weight; in such parts as rocker arms and lift shaft arms they replace expensive forgings and demand less labor in finishing, since they can be cast more nearly to finished sizes.

Greater strength, without change in dimensions or increased weight, may be obtained by replacing iron castings with those of gun iron or malleable iron, or of "steeled iron."

When strength is of little consequence, and forms are complicated, thin iron castings may often be substituted for sheet iron or steel. As an example may be mentioned the boxes in cabs used to cover the rear driving springs, commonly made of sheet metal.

In many cases malleable iron may be substituted for brass, but caution is needed in this, as, in the case of light castings requiring much finishing, the greater cost of machine work on malleable iron sometimes overbalances the difference in cost of material.

Having now examined the principles of design which should be followed in striving for economical results, let us look for a little at the conditions which make for or against economy in shop practice, that is, in the actual execution of accepted designs.

We immediately find one basic principle; the extent to which the use of special or automatic machines may profitably be carried is proportional to the number of identical operations to be performed. If a single stud of certain size, for instance, is needed, no tool is more economical than a plain lathe; if a hundred of the same size are needed, the turret lathe at once proves its value; if a hundred thousand be required, the greater cost of the full automatic machine will be amply repaid. In a locomotive repair shop this practice can be followed to a slight extent only, yet the principle remains true. I know of no operation repeated, even in a large repair shop, so often as to justify the use of an automatic machine; but the use of turret tools and the simpler types of special tools may be carried to a considerable extent, even in small shops. This can thoroughly be done only by systematic effort to reduce the variety of small parts, and increase the number of parts of each approved type which may be made up at one time. In other words, the way to economical production of small parts for locomotives lies in the adoption, as far as possible, of standard patterns and sizes.

The first step in this direction is naturally in the way of brass fittings. All valves and cocks used on the locomotives of any road should be of established standard pattern. Once standardized, even on a road of moderate size, they may profitably all be made at one point, and thus such a quantity of work obtained as will justify the introduction of modern brass finishing tools.

All studs, pins, etc., should be brought to standard sizes and threads, and made in quantities, on turret lathes.

By the use of standard reamers all finished taper bolts may be standardized and kept in stock ready for use, avoiding the expense and delay of making bolts to fit holes already reamed.

When many pieces are to be drilled alike, the use of jigs with hardened bushings insures accuracy of work, and enables it to be done by laborers of a cheaper class.

When duplicate forgings of steel or iron are needed, the use of simple dies and formers under the steam hammer is productive of much saving.

The use of cores to avoid drilling holes in castings is worthy of careful attention, though caution is needed, as in the case of coring stud holes in cylinder heads, when it proved that the saving was more than balanced by the difficulty of facing a surface pierced with cored holes.

In the treatment of finished surfaces, where smoothness of surface without extreme accuracy is desired, the use of emery wheels is decidedly cheaper than draw-filling and hand-polishing. For main and side rods, guides and similar large articles, an emery wheel mounted in a swinging frame, so that it can be moved over the work at will, gives excellent results.

Axle journals and crank pins may be burnished by rotation under pressure from a hardened steel roller, the results being much better, as well as cheaper, than those obtained by filing and polishing.

In boiler repairs, the pneumatic tool for chipping, calking and beading flues promises much saving in labor. The practice of setting tubes with copper ferrules in front tube sheets seems to involve needless expense, as tubes simply expanded into the sheet without ferrules or beading give no trouble whatever.

On large roads a steady demand exists for new fireboxes, new boilers for locomotives, and stationary purposes, sufficient to justify the equipment of a complete plant for such work if all this work can be concentrated at one point. Such a plant would profitably contain heavy punches and shears, plate edge planer, bending rolls and hydraulic riveter—in fact, all the modern tools for economical boiler work, with the exception of the flanging press.

I trust that I have made evident one conclusion. Opportunity for the reduction of the labor cost of locomotive maintenance lies less in doing away with the little that is superfluous than in the systematic adaptation of the means available to the ends desired. Only by intelligent design, by the use of the most suitable materials, with constant reference to the available facilities, together with the intelligent employment of those facilities, can the best results be obtained.

Modern British Express Engines—Their Construction and Work.

BY CHARLES ROUS-MARTEN.

In dealing with the various types of modern express engines on the railways of Great Britain, considering them with regard to construction and work done, it will be found convenient to class them in three main divisions, as "Single," "Coupled," and "Compound." A fourth division will subsequently be required. It will be devoted to express engines of the four-cylinder type, but as yet these number only four in all Great Britain and are purely in the stage of experiment. But each of the other three divisions has a very large number of representatives and has become a standard type in this country. Nor is there at present any symptom of either the single-wheel or the coupled type becoming extinct. As regards the compound type, the matter is open to more doubt.

Single-Wheel Engines.

Originally the single-driver engine was the only type of express engine used in these Islands. It was not until 1855 that coupled engines were definitely designed for express duty and then they came into use very gradually. About 15 years ago the race of single wheelers appeared to be doomed to extinction. Even on the Great Western and Great Northern lines, which had been the chief champions of the single type, the latest built locomotives used on express duty were coupled.

Perhaps the credit of initiating the fresh departure may be awarded to the Manchester, Sheffield & Lincolnshire, now the Great Central line, whose able Chief Engineer, the late Mr. Charles Sacré, built in 1883 his well-known "500" class of single engines for the fast train services between Manchester and Liverpool, Manchester and Southport, and Manchester and Grantham (part of the Manchester-London route) respectively. These engines had 7 ft. 6 in. single drivers and outside cylinders 17½ × 26. They were supposed to have 17½ tons weight on the drivers, but their designer himself admitted to me that their actual adhesion weight was about 20 tons. They have done good work during the past 14 years. One of their duties consisted in taking hourly trains of 120 tons from Manchester to Warrington, 15¾ miles, in 18 minutes. I made many experimental journeys and usually found this fast time well kept. Indeed, in one case it was considerably improved upon, for the run was done in 15 minutes 44 seconds. On the London-Manchester service one of the engines passed Retford (33¼ miles), slowing to five miles an hour, in exactly 33 minutes from the start from Grantham. Both roads are fairly easy, but the performances were undoubtedly smart. These engines, however, have proved somewhat heavy on repairs, and the absence of a leading bogie has been detrimental. The type is not being perpetuated.

Next, in 1884, came two somewhat notable new single-wheelers built by Mr. W. Dean for the Great Western Railway. These were intended as the pioneers of a class that should succeed the famous 8-ft. singles on the removal of the 7-ft. gage. They had 7 ft. 8 in. driving-wheels and inside cylinders, 18×26, but no bogie. Failing to give satisfactory results, they were rebuilt with 7-ft. wheels in accordance with the standard type, but retaining their 26-in. piston stroke instead of the 24-in. of the others. Since being altered they have worked very well and I found one of them keep time on a slightly uphill run timed at 45 miles an hour, with a load of nearly 300 tons.*

In the same year the Great Northern resumed the construction of the celebrated 8 ft. 1 in. singles, which, originally designed by the late Mr. P. Stirling in 1869, had done the bulk of the best express work on that swiftest of English lines. Ten more of these were built in the years 1884-87 and 1893.

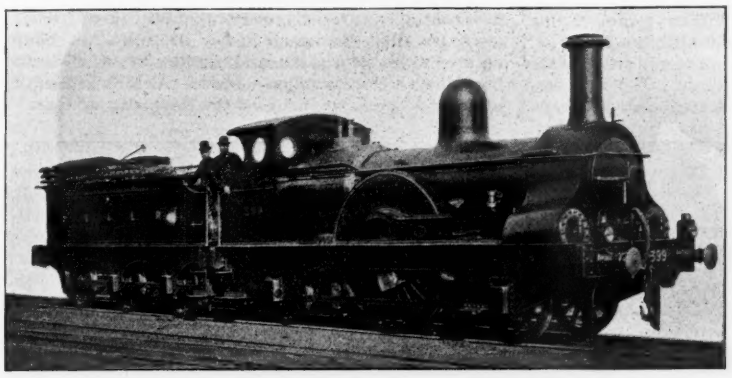
But in 1885 Mr. Stirling initiated a new departure with his 7 ft. 7 in. singles having inside cylinders 18½ × 26, and 160 lbs. steam pressure, but no bogie. The adoption of so large a driver with inside cylinders was looked on with disfavor by some authorities who cherished the antiquated prejudice against a high center of gravity, and the experience of those first two 7 ft. 8 in. engines on the Great Western was deemed an unfavorable augury for the new Great Northern engines. But the experiment proved entirely satisfactory. The engines were quite as powerful as the 8-ft. singles with outside cylinders and cost some £300 apiece less to build. In the end 23 of this class were constructed, and all have done excellent work, as I shall show later.

In 1884 Mr. S. W. Johnson informed me that he had decided to build some single-driver engines for the Midland line to take the faster and lighter expresses. He then intended to have 8-ft. drivers with outside cylinders and leading bogies; in fact, an enlarged edition of the type into which he formerly converted some of the old single-wheelers on the Great Eastern line. But subsequently he modified his plans and adopted a 7 ft. 4 in. wheel, with inside cylinders 18 × 26, and 160 lbs. steam.

The first of this class came out in 1887 and proved so efficient that 18 in all were built in the years 1887-90. In 1889, however, Mr. Johnson determined on enlarging these dimensions and brought out a locomotive with 7 ft. 6 in. single-drivers, and inside cylinders 18½ × 26. Of these 42 were constructed up to 1894, and subsequently 10 more with 19-in. cylinders, all doing admirable work on all classes of express trains.

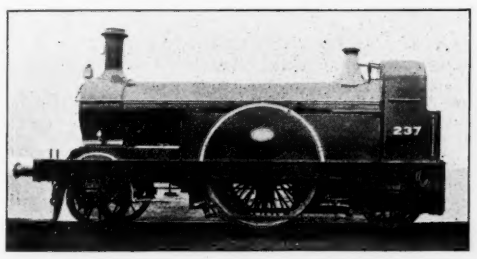
*The loads mentioned in this article are all exclusive of engine and tender.

In 1886 a 7-ft. single-driver engine with inside cylinders 18 × 26, 150 lbs. steam and leading bogie, was designed for the Caledonian Railway by Mr. D. Drummond, and this engine ("No. 123") has proved very useful with light fast trains, such as those which ran in the London-Edinburgh race of 1888, but deficient boiler power has rendered her less suitable for heavy expresses and no more of the same type have been built.



Manchester, Sheffield & Lincolnshire, No. 399. (C. Sacre.) Driving Wheels, 7 ft. 6 in.; Cylinders, 17½ × 26.

In 1889 Mr. T. W. Worsdell built for the North Eastern 10 single-driver compound engines, on the Worsdell-Von Borries system, with 7 ft. 1 in. wheels, and cylinders 18 and 26 × 24. These he immediately followed with 10 more having 7 ft. 7 in. wheels and cylinders 20 and 28 × 24. These, however, belong more strictly to the "Compound" section of my subject, as do also the "double-single" compounds built by Mr. F. W. Webb for the London & North Western. But the second batch of Worsdell compound singles come within the scope of the present article because they have all been rebuilt as new non-compound singles by the present Locomotive Superintendent of the line. I shall return to them later.



Great Northern, No. 237. (P. Stirling.) Driving Wheels, 7 ft. 7 in.; Cylinders, 18½ × 26.

I now come to what I may term the "modernest" of modern single wheelers. These comprise the newest classes of express engines built respectively for the Great Western, Great Eastern, Great Northern and Midland lines.

Midland, No. 1864. (S W. Johnson.) Driving Wheels, 7 ft. 6 in.; Cylinders, 18½ × 26.

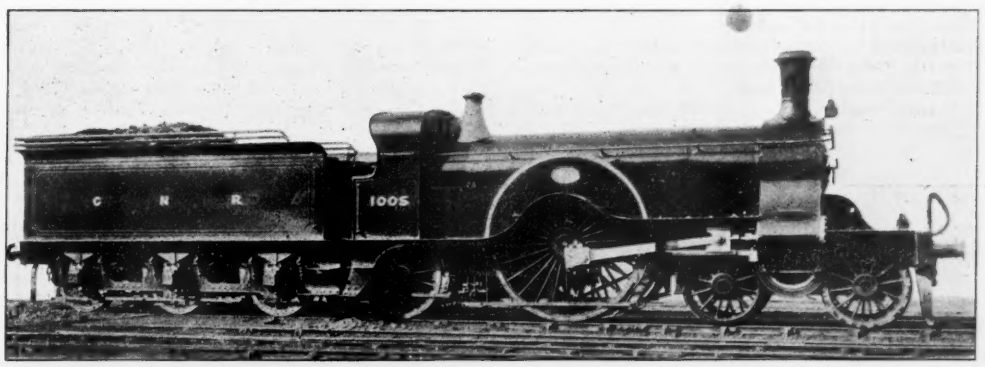
When, in 1892, Brunel's 7-ft. gage was finally abolished on the Great Western, the London-Exeter expresses were taken on the standard gage by a new class of engines built by Mr. Dean with 7 ft. 8 in. single-drivers, cylinders 20 × 24, and 19 tons adhesion weight, but no bogie. Experience soon proved that the weight on the single drivers was too great, that with 1,444 sq. ft. of heating surface the boilers could not supply enough steam for 20-in. cylinders to use advantageously, and that a leading bogie was desirable. All the engines, 30 in number, have been rebuilt with leading bogie, 19-in. cylinders, 1 561 sq. ft. of heating surface, and only 18 tons on the drivers. As rebuilt, the engines have proved very successful, and 50 more of the same class have been turned out at the Swindon Works, including 20 during the year just ended.

On the Great Eastern, Mr. J. Holden has built 21 single-wheelers, taking his standard type of 7 ft. coupled express engine with cylinders 18 × 24, dispensing with the coupling-rods, and substituting a small pair of trailing wheels for the pair of 7 ft. coupled wheels. Several of these have been fitted with Mr. Holden's patent apparatus for burning liquid fuel.

For the Great Northern, the late Mr. P. Stirling built early in 1895 his latest type of single. It was simply an enlargement of his famous 8-ft. class which had done such splendid work for 25 years. By giving the new engines 19½-in. cylinders instead of 18-in., 170 lbs. steam instead of 140 lbs., 19 tons adhesion weight, and increased boiler power, he produced a locomotive which has proved itself equal even to the hardest work demanded on that line, pulling very heavy trains at great speeds and with marked economy. Only six of these (Nos. 1003-8) have as yet been built.

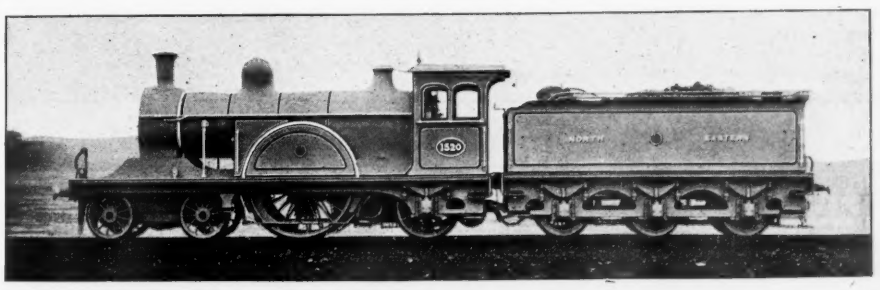
His successor, Mr. H. A. Ivatt, has rebuilt as virtual new engines four of the older 8-ft. singles, giving them domes, greatly increased boiler power and firebox area and 175 lbs. steam pressure. These have turned out remarkably well and all the old engines will be similarly reconstructed as they come in for heavy repairs.

On the North Eastern line, Mr. Wilson Worsdell, the present Locomotive Superintendent, has also produced what is virtually a new class of single-wheelers. Finding that, owing to the great size of the inside cylinders (20 and 28 in.) compelling the valve chests to be placed outside, the engines were often placed at a disadvantage through the exposed chests cracking in frosty weather, he rebuilt them as non-compounds with inside cylinders 19 × 24, and in this shape they have done and are doing excellent work.



Great Northern, No. 1005. (P. Stirling.) Driving Wheels, 8 ft. 1 in.; Cylinders, 19½ × 28.

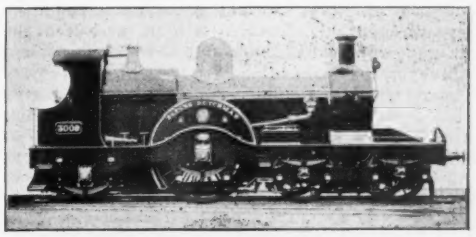
Mr. S. W. Johnson's latest departure on the Midland has been to build five new single-driver expresses with wheels 7 ft. 9 in. diameter, the largest ever put under an inside-cylinder engine on the 4 ft. 8½ in. gage. These remarkably handsome engines came into work in 1897 and are giving admirable performances with very fast and heavy trains, the most recent feat of one being to break all the previous records of railway speed in this country, while the fuel-consumption is, I am officially informed, specially economical.



North Eastern, No. 1520. (W. Worsdell.) Driving Wheels, 7 ft. 7 in; Cylinders, 19 × 24.

Main Features of Design.—Summarizing then the main features of modern British locomotive practice in respect of single-driver engines, it is in every case but one to place the cylinders inside, the sole exception being the Great Northern 8-ft. engines, the existence of that exception being due to the great length of piston stroke—28 in.—which, in association with an 8 ft. 1½ in. wheel, would raise the boiler higher than has ever yet been seen in British practice. Personally I am by no means convinced that this height would be excessive. Expert opinion, however, moves slowly in this country, and at present the height of boiler which is commonly adopted in American practice is not seen in Great Britain.

Apart from this one exception, inside cylinders are met with in every case, that of the Great Northern 7 ft. 7 in. engines included. Of cylinder diameters, we have 19 in. on the Great Western and North Eastern; 18 in. on the Great Eastern and Caledonian; 19½ in., 19 in., 18½ in. and 18 in. on the Great Northern and Midland The piston stroke is 24 in. on the Great Western, Great Eastern and North Eastern; 26 in. on the Great Northern, Midland and Caledonian. The nominal steam pressure is 175 lbs. on the North Eastern; 170 and 160 lbs. on the Great Northern and Midland; 160 lbs. on the Great Western and Great Eastern and 150 lbs. in the case of the Caledonian single.



Great Western, No. 3009. (W. Dean.) Driving Wheels, 7 ft. 8 in.; Cylinders, 19 × 24.

So far as I have been able to judge as the result of conversations with the leading locomotive engineers of this country, the chief objections taken to outside cylinders are their exposure to cold air, the heavier and more expensive construction which they involve and the alternate "punching" motion which they set up as compared with the steadier and more direct movement in the case of inside cylinders. The alleged weakness of the cranked axle and its presumed greater liability to fracture are stoutly disputed as non-existent when the design and workmanship are good. The advantage of greater accessibility of working parts in the case of outside cylinders does not commend itself to British designers who prefer the superior external neatness of the other plan. Hence the inside-cylinder method is now all but universal in Great Britain, the sole exceptions being tolerated under protest, as it were, on account of special necessities of construction.

Work of the Single-Wheelers.—Coming now to the actual work done by these engines under my personal observation, I find a large number of excellent performances. But in dealing with these for purposes of comparison it is obviously necessary to bear in mind the respective capacities of the engines compared, having regard alike to tractive force (derived from cylinder diameter, piston stroke, and size of driving-wheel), boiler power, steam pressure and adhesion weight, as otherwise a comparison would lack fairness and uniformity of basis.

On the Great Western Railway Mr. Dean's 7 ft. 8 in.

single-wheelers have won special fame through the efficiency with which they have performed the longest daily non-stopping run in the world, that from London to Exeter, a distance of just 194 miles. The time allowed has been 3 hrs. 43 min., giving an average speed of 52.2 miles an hour. But the actual rate is much better than this would make it appear. The pace has had to be reduced to 10 miles an hour past Reading, Bath and Taunton stations, and the deviation loop by which Bristol station is avoided not only lengthens the journey by several chains, but also compels slowing to 10 miles an hour for more than a mile, this alone involving a loss of fully five minutes; and taking also into account the delays through the alteration still in progress of the permanent way from the longitudinal to the transverse sleeper type, the booked time is equivalent to a run in 3½ hours, which would make the average quite 56 miles an hour, and actual experience proves that even more than that average rate has to be maintained.

Neither the road nor this particular train-load can be termed heavy. There are not more than five miles of steeper grades than 1 in 200, and these grades are confined to a single incline known as the Wellington bank, which has 1 mile of 1 in 80 and 1 in 81, 1¼ of 1 in 90, 3 of 1 in 103 to 1 in 167. Also 5 miles, much of 1 in 200, occur just after Bristol is passed. Otherwise the grades are very easy. Water is picked up at two points while running at speed.

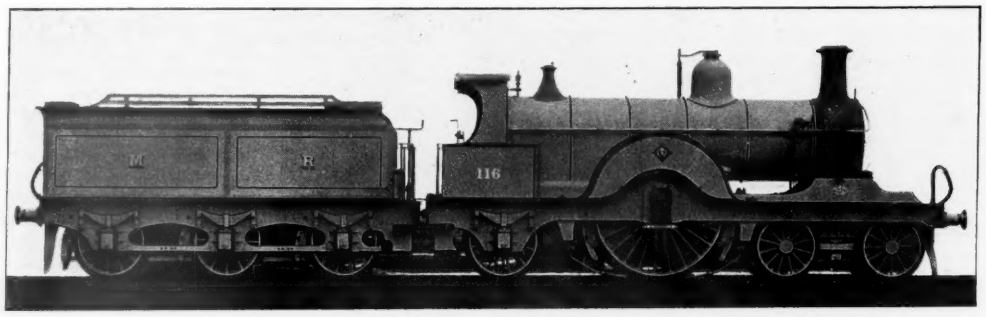
Making three experimental journeys with this train, the run of 194 miles was twice accomplished without intermediate stop in, 3 hrs. 36 min. 43 sec., and 3 hrs. 36 min. 25 sec., respectively. In the third instance the train was stopped by signal after running 170 miles in 3 hrs. 18 min., with 10 min. lost by signals. The load behind the tender was 120 to 140 tons. In one case a speed of over 60 miles an hour was steadily maintained up a gradient rising 1 in 660, and 41 miles an hour up 1 in 81. In another case the engine maintained 56 miles an hour up 1 in 115. On falling gradients I timed the engines at 83.3, 82.5 and 81.8 miles an hour.

The fastest timing on the Great Western is London to Bath, 106 miles 70 chains, in 2 hrs., or 53.4 miles an hour. One of these engines made this run with a load of 200 tons in 1 hr. 57 min. 2 sec., and another maintained 37 miles an hour up 1 in 100, all in tunnel, with 175 tons. Considering that the tractive force per pound of effective pressure in cylinders is only 94.2 lbs., this represents very good work.

Mr. Holden's 7-ft. single-wheelers on the Great Eastern, although given only 92.5 lbs. of tractive force, have proved themselves doughty champions of the single-driver type as against the coupled type, otherwise identical. They have regularly run the special Cromer express from London to North Walsham, 131 miles, without stop, the timing to the junction (114 miles), whence the line is single, being 51 miles an hour. Such gradients as 1 in 70 (¾ mile) three miles of 1 in 84 and 1 in 90, and longer distances of 1 in 132, etc., have to be encountered. The load, on the occasion of my experimental journeys, was 170 tons, but the engine did the first 1¼ miles from the start (¾ being 1 in 70 up), in 3 min. 5 sec., and maintained 31.1 miles an hour up 1 in 84. The average rate for the whole run was 53.5 miles an hour, very evenly sustained, nothing higher than 65 miles an hour having been run down the falling grades.

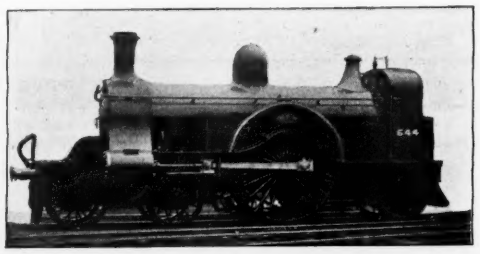
In another case the engine took 220 tons over the first 69 miles of the same road at 48 miles an hour, again climbing the banks of 1 in 70 and 1 in 84 with ease, the speed never falling below 28 miles an hour. And in a third instance a load of 260 tons was taken along same length, time being kept and the steep banks being ascended at a steady rate of 25 miles an hour, whereas a coupled engine, otherwise identical, made distinctly inferior traveling with a similar load.

This excellent work was done with the single-wheelers, fitted with Mr. Holden's patent liquid-fuel-burning apparatus which has now long passed its trial stage and is admittedly a complete success. Without recapitulating details which have already found publication, I may say that its salient feature consists in the combustion of the the liquid fuel in association with coal. That is to say, a base is provided of incandescent coal and coke, and upon this two jets project the oil in the form of spray, together with a current of air. A very powerful and clean fire is the result and the steam can be steadily kept up at a point just below blowing-off, thus avoiding waste, while the enhanced cleanliness and avoidance of smoke and dust involve a substantial saving in expense as well as superior comfort. At present Mr. Holden has 16 express engines, 6 single and 10 coupled, fitted with the apparatus, and he is still extending its use. [For a detailed description see the "Railroad Gazette" of Feb. 20, 1892.

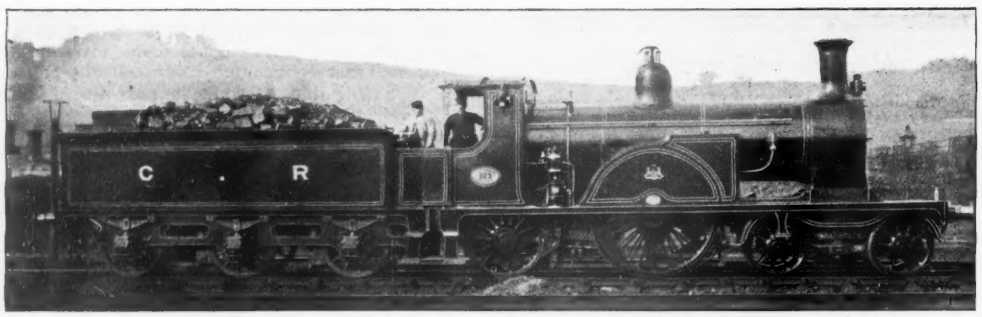


Midland, No 116. (S. W Johnson.) Driving Wheels, 7 ft 9 in.; Cylinders, 19½ × 26.

Great Eastern, No. 1006. (J. Holden.) Driving Wheels, 7 ft; Cylinders, 18 × 24.



Great Northern, No. 544 (P Stirling and H A Ivatt.)
Driving Wheels, 3 ft. 1 in.; Cylinders, 18 × 28



Caledonian, No. 123. (D. Drummond.) Driving Wheels, 7 ft.; Cylinders, 18 × 26

The Great Northern 8-ft. singles are now divisible into three classes, viz., the old type dating from 1870 onward which have 140 to 160 lbs. pressure, according to the period of their boilers, and cylinders mostly bored out to about 18½ in.; Mr. Stirling's latest class with 170 lbs. pressure and 19½-in. cylinders; and Mr. Ivatt's rebuilds of the first-class, which have 175 lbs. pressure and 18 in. cylinders.

Although the engines of the oldest class have too often been overloaded of late and have consequently lost time, being frequently required to take 250 tons at 54 or 56 miles an hour, whereas they were designed only to take 150 tons at 51 miles an hour, they have yet given, under favorable conditions of weather and load, many fine performances. Perhaps the best in my experience was a run with a load of no less than 276 tons from Peterborough to Doncaster, 79¾ miles, in 93½ min., without assistance and in spite of a strong side wind. This distance begins with a long climb of 24 miles to Stoke Summit, much of the distance being at 1 in 200 and the last three miles at 1 in 178. The speed did not fall below 37 miles an hour up the 1 in 178, even with that load. Another of these engines took 246 tons from London to Peterborough, 76¼ miles, in 86¼ min., about half of the distance being uphill, mostly at 1 in 200 but beginning with 1 in 105 and 1 in 110 for two miles and having short lengths of 1 in 100 and 1 in 150.

Those of this class which Mr. Ivatt has rebuilt with domes, larger boilers and fireboxes and 175 lbs. steam pressure, are doing excellent work with heavy fast trains. For example, the first of the number took 270 tons from Grantham to Doncaster, 50½ miles, in 59 min. 2 sec., maintaining 40 miles an hour up 1 in 200 with that load and 58 miles an hour along six miles of dead level. Another hauled 247 tons 44 miles, including 20 of continuous ascent, much at 1 in 200, in 49¾ min., start to stop, not going below 47 miles an hour up five miles of 1 in 200 and running at 80 miles an hour down a corresponding descent. A third kept up a speed of 61 miles an hour on the level with 245 tons.

As for the larger class last constructed by the late Mr. P. Stirling, their power and swiftness are very great. I have known one of them to take 250 tons on the level at 65 miles an hour or up 1 in 178 at 50, also to take 100 tons at 60 miles an hour up ascents of 1 in 200. One run from Grantham to York, 82¾ miles, in 80 min. 31 sec. with a load of 190 tons was especially praiseworthy.

All three classes of the 8-ft. engines have frequently attained speeds of over 80 miles an hour and maintained them for several miles, and they have reached 84, even then being manifestly within their powers. It has never been definitely ascertained what is the utmost they can do, though no locomotives enjoy wider fame on the score of swiftness. Their exceptional—indeed at present unequaled—length of piston stroke, while increasing their haulage power, may possibly be a disadvantage in some degree as regards the attainment of extreme speeds by causing augmented piston velocity, but I suspect that if really put to the test they would not come out second in a race.

In the case of the Great Northern singles, with 7 ft. 7 in. wheels and inside cylinders, a long record of admirable work exists. Among the finest in my experience I may instance a run from Peterborough to Doncaster (79¾ miles), with 230 tons, in 85 min, 12 sec., Grantham being passed in 33½ min. after the start, though the 29¼ miles included the long rise to Stoke Tunnel, the last 15¼ miles, mostly at 1 in 200 and 1 in 178, being ascended in 18½ min. Another ran 26 miles, virtually a dead level, in 25 min. 56 sec. with a load of 270 tons; a third took 212 tons from Grantham to London, 105½ miles, with three checks, in 115½ min., maintaining 80 miles an hour for 10 consecutive miles and attaining a maximum of 83.7 with that load down 1 in 200; and a fourth with a light load succeeded in reaching a speed of 86.5 miles an hour, at that time the highest authentically recorded in Great Britain.

Some of these engines have had their 18½-in. cylinders bored out to 18¾ and 18⅞ in.; others have had the size reduced to 18 in. All appear to perform equally well, notwithstanding those differences in nominal power.

On the Midland line Mr. Johnson has placed four different classes of modern single-wheelers. The original type, with 7 ft. 4 in. drivers and 18 in. cylinders, have always been remarkably efficient and still perform much the same duty as their nominally more powerful successors. Among the best of many notable feats I may instance a run from Leicester to Bedford, 49½ miles, in 50 min. 49 sec., with 184 tons. What renders this particularly noteworthy is that half the distance is uphill and three severe banks of 1 in 120, 1 in 132, and 1 in 160 each extending for several miles have to be climbed. The downhill speed several times rose to 82 miles an hour. With the lighter expresses, many surprisingly swift runs were made. Also with heavy Scotch expresses the 99 miles from Leicester to London, which has a 16-mile climb at 1 in 200 after Bedford and several short climbs in addition to these already mentioned as between Leicester and Bed-

ford, were several times run in 1 hour 47 min. to 1 hour 49 min.

The 7 ft. 6 in. singles on the same line, with 18½-in. cylinders, and the same class with 19-in. cylinders, which are virtually identical, have always proved most valuable engines. My records of their performances show these to have been much about the same as those of the 7 ft. 4 in. class, but I have noted a higher maximum speed with three different 7 ft. 6 in. engines, viz., 84.1 miles an hour.

But Mr. Johnson's latest development of this type, the splendid looking single wheelers of the 115–119 class, having 7 ft. 9 in. drivers and cylinders 19½ × 26, bid fair to surpass the finest of the many fine express engines on that road. One of these has already broken all British speed records by achieving an unquestionable rate of 90 miles an hour and by sustaining a speed of over 80 miles an hour for 13 consecutive miles with a load of 160 tons. Another noteworthy feat consisted in taking the Scotch dining car express of 140 tons from London to Nottingham, 124 miles, without a stop, in 2 hrs. 15 min. 44 sec., in spite of 5¾ min. being lost by signals and road repairs, which left the net time 130 min. Several heavy grades have to be climbed in this journey, including 4 miles continuously of 1 in 100 and 1 in 119. Up a bank of 1 in 167 a speed of 56.2 miles an hour was easily maintained. The train stopped at Nottingham 7 min. before schedule time in spite of nearly 6 min. special delays.

On another occasion one of these locomotives ran with a Scotch dining car express, weighing nearly 200 tons, from Leicester to Finchley, 96 miles, in 104 min. 25 sec., all the heavy grades previously mentioned having to be climbed; and another took a load of 150 tons from Nottingham to Wellingborough, 59 miles, in 63 min., and from Wellingborough to Kentish Town, 63¼ miles, in 66¼ min., several banks having to be ascended in each case. M. Johnson informs me that the coal consumption of these engines, so far as yet tested, has averaged only 24.56 lbs. per mile. They are therefore obviously economical. Their number will probably be multiplied ere long.

To the rebuilding by Mr. Wilson Worsdell, the present Chief Locomotive Engineer of the North Eastern Railway, of 10 large single-driver engines which were originally designed and constructed as compounds by his predecessor and brother, Mr. T. W. Worsdell, I have already made passing reference. In their present form as single high-pressure engines with 175 lbs. of steam, they have given many admirable performances. One drew a train of 220 tons from Newcastle to York, 80½ miles, in 91½ min., with an intermediate stop, and maintained 40 miles an hour with that load up a grade of 1 in 150. The last 44 miles into York were done from start to stop with that load in 44 minutes. Another of the same class ran with 187 tons from Newcastle to Edinburgh, stopping twice on the way, in 2 hours 28 min., the distance being 124½ miles, much of it somewhat heavy. One with 134 tons starting from York passed Darlington (44 miles of rising gradients) in 42 min. 54 sec., and reached Newcastle (80½ miles) in 79 min. 54 sec., although 3 min. were lost by two checks. In two other cases one of these engines stopped at Darlington in just 44 min. from York, the loads being respectively 120 and 135 tons. One of this class attained 85.7 miles an hour down a falling grade. Excellent as the engines are, however, the type appears unlikely to be perpetuated, the coupled design finding more favor with the present Locomotive Superintendent.

Modern locomotives of the single-driver type have but one solitary representative on the Caledonian Railway. That sole specimen has, however, been the object of much hero worship, and has been accredited with such extensive capabilities, chiefly mythical, that I cannot pass it over. Bearing the easily remembered number, "123," this engine suddenly sprang into fame in 1888 through being daily employed in running the "racing" train from Carlisle to Edinburgh. This duty was executed in a manner which left nothing to be desired. Time was gained on every day, and once the heavy run of 100¾ miles was completed in 102 min. 33 sec., although it included the steep Beattock bank, of which 6 miles are at 1 in 75, 2 at 1 in 80, and 2 at 1 in 88, and several lesser ascents. The loads, however, were very light, only 76 tons.

As I found an impression widely prevalent that "123," if employed in the "Race to Aberdeen" of 1895, would have made a better time than the 6 ft. 6 in. coupled engines which were then used, I took a recent opportunity when the engine was freshly out of the workshops, after a thorough overhaul, and was guaranteed to be in her most efficient trim, to make two experimental trips with her. The engine was made to do her best and performed very creditably, but, as I had fully expected, failed utterly to equal the achievements of her more powerful coupled rivals, even in mere speed, although these latter had drawn far heavier loads. No. 123 took 155 tons up 1 in 100 at 30 miles an hour, and attained 81.8 miles an hour downhill, but the coupled engines of the "Dunalastair" class took 170 tons up 1 in 75 at 36 miles an hour, and attained 85.7 downhill. The celebrated run from Perth to Forfar which was timed in 1896 faster from start to stop than any scheduled run ever has been in the Kingdom, viz., 60.9 miles an hour, and which the "Dunalastair" engines easily did at 63.5 miles an hour, No. 123 could not accomplish faster than at 58. The Forfar-Perth length (32½ miles), which was run in the opposite direction by a "Dunalastair" with 233 tons in 31 min. 34 sec., No. 123 could not get over in less than 32 min. 20 sec., with a load of only 112 tons.

Careful experiments made it quite clear that the boiler was too small for fast work with really heavy trains, and the widespread fancy that No. 123, if really put to it, could "beat all creation" has now been rudely but conclusively dispelled.

It may be worth while to mention that all my speed-records were obtained by the process which alone I have found entirely trustworthy, namely, by employing three tested chronographs, one having a split-seconds hand. This last is started at the beginning of a particular length on which the speed is likely to be high. With the other two the successive quarter-miles are taken, both buttons being simultaneously pressed so as to start one instrument and stop the other. The split movement is used at the end of each mile as a check on the quarter-mile records and the passing times of stations, signal-boxes, bridges, etc., recorded by watch, form a second check. In this way both the element of "personal equation" and the risk of a mechanical recorder going astray are virtually escaped, and a very close approximation to absolute accuracy is attained. I have not found it safe to rely implicitly upon any other method.

The following table shows the chief dimensions of the engines dealt with in this article:

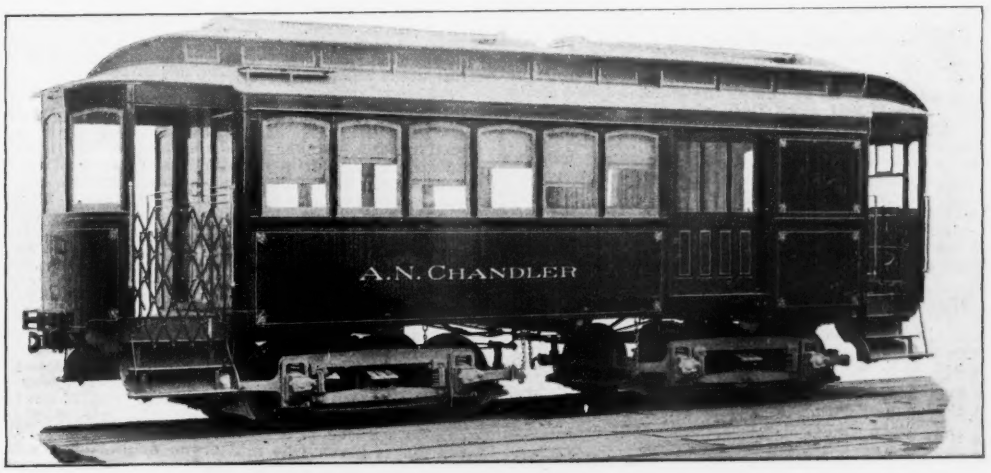
SOME FAMOUS ENGLISH "SINGLE-WHEELERS."

Railway.	Diameter driving wheels.	Size of cylinders.	Steam pressure.	Total heating surface.	Firebox heating surface.	Grate area.	Total weight of engine.	Weight on driving wheel.	Bogie or radial axle.
	ft. in.	in.	lbs.	sq. ft.	sq. ft.	sq. ft.	Tons.	Tons.	
Great Western	7 8	19 × 24	160	1,561	127.0	20.80	49.0	18.0	Bogie
Great Eastern	7.0	18 × 24	160	1,217	100.9	18.00	41.0	17.0	Radial
Great Northern	8.1	19½ × 28	170	1,631	121.0	20.00	49.5	19 2	Bogie
Great Northern	8.1	18½ × 28	140	1,045	109.0	17.75	45.1	17.0	Bogie
Great Northern	8.1	18 × 28	175	1,210	114.0	23.30	46.0	18.0	Bogie
Great Northern	7.7	18½ × 26	160	1,045	119.0	17.75	42.0	17.5	Radial
Midland	7.9	19½ × 26	170	1,233	128.0	21.30	47.1	18.5	Bogie
Midland	7.6	18½ × 26	160	1,240	117.0	19.60	43.0	17.5	Bogie
North Eastern	7.6	19 × 24	175	1,139	123.0	20.70	45.5	19.0	Bogie
Caledonian	7.0	18 × 26	150	1,053	102.9	17.25	41.5	17.0	Bogie

The other Midland singles having 7 ft. 4 in. drivers and 19-in. cylinders respectively so closely resemble those now illustrated that separate views are unnecessary. The illustrations are from photographs published by F. Moore, London. All the loads referred to are exclusive of engine and tender.

A Brill Car for Heavy Electric Work.

The illustration shows a type of car recently turned out by the J. G. Brill Company for service heavier and faster than that of the ordinary electric railroad. It is designed, in fact, to do the kind of service now done by steam trains, particularly on suburban and interurban lines. The car was built for the Ballston Terminal Railroad Co., Ballston, N. Y. One of the important features of this type of car, and one which has gone far to make it possible, is the perfecting of the truck, which permits very high speed with safety and smoothness of motion, and this car is shown as equipped with the Brill "perfect truck."



Brill Car for Heavy Electric Work.

It has a steam car platform and steps, vestibule at both ends and is divided into passenger and baggage compartments. The length over end panels is 25 ft. 4 in., width 8 ft. 4 in. The passenger compartment is 16 ft. long and seats 22 persons; the baggage compartment is a little less than 9 ft. The latter is sheathed with tongued and grooved boards and is provided with 4 ft. sliding doors at each side, an end door and a door to swing into the passenger compartment; this door is fitted with a glass sash. The platforms are 4 ft. 6 in. wide and the roof is of the regular steam car pattern. Two trolley poles and boards are provided so that the car may run in either direction. Two trolley poles are found desirable upon these long cars. There are two sand boxes, two gongs, and gates to the vestibules. There are six windows on each side of the passenger compartment which is fitted with cherry slat seats; drop seats are also placed in the baggage compartment for use in case of crowding and for the accommodation of smokers.

Altogether the car is as comfortable and convenient as could be desired for use on a road where high speeds are needed between stations separated by short intervals. Cars of this type permit a frequent train service with a small cost for wages; only two men are needed to operate the car.

The M. C. B. Coupler.*

The coupler question is one that has received a great deal of attention, and one on which many valuable papers have been written and discussed. Very extensive tests have been made also at different times, which have been of great help in perfecting the coupler. The drop test, accompanied by good specifications, has enabled railroad companies to protect themselves against bad designs as well as poor material. There are some railroads which, for some reason, have not obtained the advantages that may be derived from the drop test and from specifications, and an examination would likely show that th neglect to make use of the drop test and to require the fulfilling of good specifications has resulted in much loss to them. The coupler should receive as much and as careful attention as do car wheels, or any other part of the car.

It seems that the advantage accruing from the use of drop tests of couplers is not properly appreciated. Possibly the tests are quite severe, but this is only to provide an extra safeguard, just as the tests of wheels and axles are also more severe than the shocks which the wheels and axles receive in service. The drop test for couplers represents more nearly the treatment which the couplers receive in service than do the drop tests for wheels and axles. Couplers in service are subjected at times to destructive jerks and blows; it is difficult to measure the force of such blows, but it is safe to assume that at the present day, with our heavy cars loaded to their full capacity, when the cars are thrown together with extreme violence, the couplers have to sustain a blow equivalent to the force of a blow delivered by a weight of 1,640 lbs. falling from a height of 10 ft. Those who place no value upon coupler tests may feel justified in holding an unfavorable opinion because of the varying results obtained at the present day upon couplers of the same make; but the discrepancies in the data obtained are due to the differing and unknown conditions under which the tests are made.

To get comparable data, the tests must be made under exactly similar conditions, and the conditions which most affect the results are quality of foundation, weight of hammer, rigidity of machine, and the means employed in holding the coupler under the drop.

The quality of foundation and weight of hammer are certainly of great importance, and apparently are given proper attention; in fact, these two fac-

* From a paper presented by Mr. Gustav Giroux, Mechanical Department, Chicago, Burlington & Quincy Railroad, at the March meeting of the Western Railway Club.

tors seem to be given all the attention, as is evidenced by the fact that, generally, specifications for couplers read as follows: "Test couplers to be placed upon a large cast steel anvil, which rests upon a heavy stone foundation, and be struck with a 1,640-lb. weight."

There are likely no tests made with a drop weight that are more severe on the foundation and on the upper construction of the drop machine than tests upon couplers; this is clearly indicated by the shaky condition of the testing machine after a small number of tests have been made, unless the machine is made exceedingly strong and rigid. When a machine becomes a little shaky and the vertical supports spring at their lower ends when the test coupler receives the blow, the conditions are more favorable to the coupler than were the machine very rigid.

The Chicago Tire & Spring Co. of Melrose Park, Ill., was the first to build a machine that had all the necessary requirements, and one on which a variety of tests, including the jerk test, could be made with rapidity. The Chicago & Northwestern Railway then built a similar drop, as did also the Shickle, Harrison & Howard Iron Co., St. Louis. These last two drops have not the jerk test arrangement, but are similar in other respects. The bed plate used for this style of drop is a large steel casting, 6 ft. by 6 ft. square, and weighing over 8,000 lbs.; it rests on a stone foundation. Near each side of the bed plate are cored two square recesses to receive the legs or uprights of the machine, which, as is usual, are of square timber; these timbers are, for a height of 8 or 9 ft., incased in heavy steel castings, which fit tightly into the recesses in the bed plate. Near the bed plate are two heavy steel braces, one at each side of the drop, that extend from one leg to the other, and are securely bolted together. A similar brace is at the top of these steel castings, leaving enough room between the uprights and the tie braces to set the coupler to be tested. The space between the stem of the coupler and the braces of the drop is filled in with iron blocks, which hold the coupler in a rigid position.

A drop so made differs very much in strength and rigidity from the average drop test machine which manufacturers have to test couplers, or drops that railroads have to make axle tests, and with which coupler tests are also sometimes made.

The means employed sometimes to hold the coupler in an upright position under the drop is to put a wooden block at each side of the stem of the coupler, then iron blocks and wedges so as to keep everything solid; others dispense with the wooden blocks and use iron blocks and wedges only. If the center line of the striking weight corresponds with the center line of support of the coupler, the kind of blocking used makes little or no difference, but because these lines do not coincide, the blocking affects materially the results of the tests. This is a point that seems to have been overlooked.

If wooden blocks are used the wood will afford a good cushion to the bar; this is clearly shown in tests by the way the wood is crushed. Iron blocks do not form a cushion and the tests are more uniform and more severe.

Table No. 1 gives data derived from tests made with a machine having a good solid foundation and drop weighing 1,640 lbs.; the machine was not built as rigid or as strong as the one described above, but a great deal more rigid and stronger than the average railroad drop. The blocking used on each side next to the stem was of wood. Tables Nos. 2 and 3 give results of coupler tests made under a drop machine similar to the one described above, and with only iron blocks at each side of the stem of the coupler. Table No. 4 shows results of tests made on a machine similar to the one from which data given in tables Nos. 2 and 3 was obtained, but wood blocks were used at each side of the stem of the coupler.

Table No. 1.

Malleable Iron Bar with Steel Knuckle—Wood Blocking.

		Guard Arm Test.				Knuckle Test.		
Kind	Date cast.	3 ft.	5 ft.	10 ft.	Remarks.	10 ft.	15 ft.	Remarks.
A	10-95	3	7	1	Broke in stem.			
A	11-95	3	5		Bar O. K. and same bar stood following knuckle test....	3	2	Bar O. K.
A	11 95	3	16		Broke.			
A	12-95	3	5		Bar O. K. and same bar stood following knuckle test....	3	4	Not broken
A	11-95	3	5		Bar O. K. and same bar stood following knuckle test....	3	2	Broke in stem
A	3-96	3	3		Bar O. K. and same bar stood following knuckle test....	3	2	Not broken
A	3-96	3	3		Bar O. K. and same bar stood following knuckle test....	3	2	Broke in stem
A	3-96	3	3		Not broken.			
A	10 96	3	8		Bar broke in stem.			
A		3	9		Bar broke in stem.			
A		3	8	2	Bar cracking in stem.			
A		3	7	1	Cracking in corner of guard arm.			
A		3	15		Bar broke in stem.			
A	11-96	3	13		Bar broke in stem.			
A	10-96	3	7	1	Guard arm broke.			
A	11 96	3	7	4	Guard arm broke.			
A	11 96	3	7	1	Not broken.			
A	12-95	3	3		Bar broke in stem.			
A	11 95	3	4		Bar broke in stem.			

Table No. 2.

Malleable Iron Bar—Iron Blocking.

Guard Arm Test.

Kind.	Date cast.	3-ft.	5-ft.	10-ft.	Remarks.
A	3-96	2	0	0	Bar broke in stem.
A	3-96	2	0	0	Bar broke in stem.
A	3-96	1	0	0	Bar broke in stem.
A	3-96	1	0	0	Bar broke in stem.
A	3-96	3	1	0	Bar cracking in stem.
A	10-96	3	3	0	Broke in guard arm.
A	10-96	3	3	0	Bar broke in stem.
A	10-96	3	1	0	Bar broke in stem.
A	10-96	3	2	0	Bar broke in stem.
A	12-96	3	3	0	Bar broke in stem.
A	12-96	3	1	0	Bar broke in stem.
B	11-96	3	1	0	Bar broke in stem.
B	11-96	3	1	0	Bar broke in stem.
C	8-97	2	0	0	Bar broke in stem.
C	8-97	3	0	0	Bar broke in stem.
C	8-97	3	2	0	Bar broke in stem.
C	7-97	3	1	0	Bar broke in stem.

Table No. 3.

Cast Steel Bar—Iron Blocking.

Guard Arm Test.

Kind.	Date cast.	3-ft.	5-ft.	10-ft.	Remarks.
D	1-96	3	7	4	Not broken; bent badly.
D	1-96	3	7	4	Not broken; bent badly.
D	1-96	3	4		Bar broke in stem.
A	4-96	3	7	1	Bar broke in stem.
A	5-96	3	7		Bar broke in stem.
A	5-96	3	3		Bar broke in stem.
A	5-96	3	7	1	Bar broke in stem.
A	5-96	3	7	1	Bar broke in stem.
A	11-96	3	7	1	Broke guard arm.
A	11-96	3	5		Broke in stem.
A	12-96	3	7	1	Broke guard arm.
A	12-96	3	7	1	Bad crack in guard arm.
A	12-96	3	2		Bar broke in stem.
A	12-96	3	7	2	Broke guard arm.
A	12-96	3	7	1	Broke guard arm.
A	1-97	3	7	2	Not broken; bent badly.

Table No. 4.

Malleable Iron Bar -Wood Blocking.

Guard Arm Test.

Kind.	Date cast.	3-ft.	5-ft.	10-ft.	Remarks.
A	12-95	3	1	0	Broke in face.
A	12-95	3	1	0	Broke in stem.
A	11-95	3	7	0	Broke in guard arm.
A	11-95	3	8	0	Broke in stem.

Cast Steel Bar—Wood Blocking.

Guard Arm Test.

Kind.	Date cast.	3-ft.	5-ft.	10-ft.	15-ft.	Remarks.
A	11-95	3	18			Not broken.
A	12-95	3	7			Not broken.
D	12-95	3	8	3	4	Broke in stem.
D	1-96	3	7	2		Broke in stem.
D	1-96	3	7	1		Broke in stem.
D	1-96	3	7	2	1	Not broken.

Table No. 5.

Steel Knuckle.

Knuckle Test (lugs driven together).

Style.	Kind.	Heat.	Date cast.	3-ft.	4-ft.	Total	Remarks.
Lap Kn'kle.	E	B335		3	3	6	Cracked in pivot pin hole
"	E	B336		3	3	6	Lugs closed O. K.
"	E	B337		3	4	7	Lugs closed O. K.
"	E	B338		3	4	7	Lugs closed O. K.
"	E	B341		3	3	6	Cracked in pivot pin hole.
"	E	B356		3	4	7	Cracked in pivot pin hole.
"	E	B352		3	3	6	Lugs closed O. K.
"	E	A383		3	5	8	Lugs closed O. K.
"	E	A385		3	5	8	Cracked in pivot pin hole.
"	A	B272		3	1	4	Cracked in pivot pin hole.
"	A	A283		3	1	4	
"	A	A418		3	7	10	
"	A	A485		3		3	Small crack in pivot pin hole.
"	A	B397		3	8	11	Lugs closed O. K.
"	A	B398		3	2	5	Cracked in pivot pin hole.
"	A	B413		3	1	4	Cracked in pivot pin hole.
"	A	B415		3	4	7	Cracked in pivot pin hole.
"	A	B437		3	3	6	Cracked in pivot pin hole.
"	A	B442		3	3	6	Cracked in pivot pin hole.
"	A2		7-21-96	3	2	5	Cracked in bottom lug.
"	A2		8- 1-96	3	3	6	Cracked in pivot pin hole.
"	A2		8- 7-96	3	4	7	Cracked in pivot pin hole.
"	A2		8- 6-96	3	2	5	Cracked in bottom lug.
"	A2		7-22-96	2		2	Cracked in bottom lug.
"	A2		7-29-96	3	4	7	Lugs closed O. K.
Face Kn'kle.	B			3	1	4	Bottom lug broke.
"	B			3		3	Bottom lug broke.
Lap Kn'kle.	F	B760		3	4	7	Cracked in bottom lug.
"	F	B761		3	5	8	Cracked in bottom lug.
"	F	B758		3	8	11	Cracked in top lug.
"	F	B759		3	8	11	Cracked in bottom lug.
"	F	B750		3	8	11	No crack; lugs still ¾ in. apart.
"	F	B753		3	8	11	No crack; lugs still ½ in. apart.
"	F	A825		3	8	11	No crack; lugs still ⅜ in. apart.
"	F	A827		3	8	11	No crack; lugs still 3/16 in. apart.

Note.—Lap knuckles "A" and "A2" are pivoted less than 3 in. from face of knuckle and knuckle "F" more than 3 in. from face of knuckle.

It is clearly shown by the results of these tests that the quality of foundation and weight of drop are not the two most essential points to look after when good reliable coupler tests are desired, but that the rigidity of the drop machine itself, as well as the means used in blocking the coupler, are two factors which seriously affect the results obtained. If these last two mentioned conditions have not received as much attention as the two others, that is, the foundation and weight of drop, it is perhaps for want of information on the part of those who design drop test machines or draw up specifications, because they have not always the same opportunity to observe these points, and the methods used at different places, as those who have the practical work of making the tests and dealing with the specifications.

Unless these facts are brought out and made public we cannot make intelligent specifications for couplers. With a little attention and more rigid specifications, this lack of uniformity in coupler tests can be reduced to a minimum. If the necessary attention is given this matter no doubt there will be developed much of interest from coupler tests. The metal having the highest physical properties, that is, elastic limit, ultimate strength and elongation, will certainly stand the most punishment so far as the testing is concerned, and a coupler made of fair quality of steel will stand more than a coupler made of a fair quality of malleable iron, but as tests are made at the present time this does not show up very clearly. If a good malleable iron coupler will stand a guard arm test of three blows at three feet and three blows at five feet without cracking when tested under a rigid drop, and with all blockings of iron, it is far better to show it in that light; and the same is true of the steel coupler.

A malleable iron coupler that will stand the above test must be of an excellent quality of material and superior to the average malleable iron that is found in couplers in service to-day. Steel couplers that would not stand the above tests would better not be put in service.

Malleable iron and steel are two different kinds of material, and couplers made from the former are generally lighter than those of steel. This is so for several reasons, one being that to get the best results from annealing, the malleable iron coupler should be made as light in section as possible. It is not right to make specifications the same for couplers made of different metals, because to do so would be to ask more from the makers of one kind of material than from makers of the other kind. There is certainly as much difference between a malleable iron coupler and a steel coupler as there is between an iron axle and a steel axle, and if the same specifications were used for both iron and steel axles it is doubtful if a satisfactory axle in either material would be obtained. It has been the practice to subject iron axles to a certain test and steel axles to a similar one, but more severe and with the addition of a chemical test which is not required in iron axles. Why not also make a distinction between the malleable iron coupler and steel coupler, at any rate as far as the drop test is concerned?

From observation I do not see why the knuckle test, as made to-day, is so commonly asked for; that is, three blows at three feet and two blows at fifteen feet. Before a coupler is adopted by a railroad it might be good practice to make a few of these tests to ascertain if the construction of the head, or the back, or side wall of the head against which the tail of the knuckle rests when locked, is made strong enough to stand the shocks. After this is settled the knuckle test is of no great value, because it does not show the strength of the knuckle under service conditions. A much better way to show the ductility of the material is to drive the lugs together. Table No. 5 shows results of tests made on knuckles subjected to this kind of a test. Knuckles passing these tests also stand the present complete coupler knuckle test, that is, three blows at ten feet and two blows at fifteen feet without cracking. The guard arm test is certainly the best test for the bar, for it shows the strength of the guard arm and the stem, as well as the quality of the material.

Up to this date very few jerk tests have been made. There are certainly some good points in favor of this kind of a test, and it represents closely the jerks the coupler receives in service.

Proposed Specifications for Cast Steel Coupler Knuckles.

. . . . . As large a number of knuckles as possible must be cast from each heat of steel.

One knuckle will be selected for test by the inspector from each heat of steel offered or fraction order. This knuckle will be submitted to the drop test prescribed below. If this knuckle fails to stand the prescribed test, one more knuckle will be taken out of the same heat and tested, and, if it fails, then that heat will be rejected. All drop tests to be made under a drop test machine as rigid as the one of the C. & N. W. Ry. Co. at Chicago.

The test knuckle will be laid horizontally on one of its lugs, upon a solid anvil, and given the following blows upon the top of one lug:

Lap knuckles pivoted 3 inches or less from center of pivot hole to face of knuckle to stand:

3 blows of 1,640 pound weight falling 3 feet.
3 blows of 1,640 pound weight falling 4 feet.

Lap knuckles pivoted over 3 inches from center of pivote hole to face of knuckle to stand:

3 blows of 1,640 pound weight falling 3 feet.
5 blows of 1,640 pound weight falling 4 feet.

Face knuckles to stand:

3 blows of 1,640 pound weight falling 3 feet.
1 blow of 1,640 pound weight falling 4 feet.

A knuckle will be considered as having failed to stand the test if it shows any cracks. . . . . .

Proposed Specifications for M. C. B. Steel Couplers.

. . . . . As many drawbars and knuckles as possible must be cast from each heat of steel used.

One drawbar will be taken for test by the inspector, from each heat of steel, and submitted to the following drop test. Blows to hit directly upon the end of the guard arm:

3 blows of 1,640 pound weight falling 3 feet.
6 blows of 1,640 pound weight falling 5 feet.

A drawbar will be considered as having failed to stand this test when it is broken before it has received 3 blows at 3 feet and 6 blows at 5 feet, or when it is cracked sufficient to allow the hammer to hit on the face of the bar, or the ears of the bar to strike against the hammer before it has received 3 blows at 3 feet and 6 blows at 5 feet.

If the test drawbar fails to stand the prescribed test a second bar will be taken from the same heat of steel as the first test bar was taken from, and if it stands the test the heat will be accepted; but if the re-test fails to stand the test, then the heat will be rejected.

If any knuckles have been cast from a heat of steel from which drawbars have also been cast, and which drawbars stand the above guard arm test, the knuckles will be accepted with no further test, but if they have been cast from a heat of steel from which no drawbars have been tested, they will then be tested according to specification for cast steel coupler knuckles.

All drop tests to be made under a drop test machine as strong and rigid as the one of the C. & N. W. Ry. at Chicago. Bar to be held firmly in machine with all iron blocks and wedges. . . . . .

Proposed Specifications for M. C. B. Malleable Iron Couplers.

. . . As many drawbars as possible must be cast from a heat of iron and all bars of one heat to be packed together and annealed together. Bars to be well annealed throughout.

If the bars have been cast and annealed in the above manner, the inspector will select one drawbar from each heat of iron offered for test; but if the bars have not been cast or annealed in the above manner, the inspector will select one drawbar out of every fifty (50) drawbars offered for test and submit it to the following drop test. Blows to hit directly upon the end of the guard arm:

3 blows of 1,640 pounds weight falling 3 feet.
3 blows of 1,640 pounds weight falling 5 feet.

A drawbar will be considered as having failed to stand this test when it is broken before it has received 3 blows at 3 feet and 3 blows at 5 feet, or when it is cracked sufficient to allow the hammer to hit on the face of the bar, or the ears of the bar to strike against the hammer before it has received 3 blows at 3 feet and 3 blows at 5 feet.

If the test bar fails to stand the prescribed test, a second bar will be taken from this same heat of iron and annealing, or lot of fifty, from which the first test bar was taken, and if it stands the test, the heat or lot will be accepted, but if the second bar fails to stand the test then the heat or lot will be rejected.

All drop tests to be made under a drop test machine as strong and rigid as the one of the C. & N. W. Ry. at Chicago. Bar to be held firmly in machine with all iron blocks and wedges. . . .

Car Roofing.

At the February meeting of the North-West Railway Club the subject of car roofing was discussed, and the discussion brought out some concise statements as to the relative value of different materials used for car roofs. The following is taken from the discussion:

Mr. Alfred Child, General Car Foreman, Northern Pacific Railway: The subject of car roofs is one that has been little discussed before railroad clubs, and why it should be so I can give no specific reason, for it is important for our box cars to have good roofs of one kind or another, and the question which naturally arises is, which is the best and which will

give the best results at the least possible cost? From my own practical experience I think the subject might well be considered from two standpoints, that of roofs for new cars and renewals for old equipment. While many of our car builders are inclined to the belief that the metal roofs are winning favor and are superior to all others, and while perhaps they are justified to some extent in their belief, yet there are many important features to be taken into consideration with metal roofs, because of the fact that they are metal. In my opinion, to get the best results with metal roofs of any type would be to put in an underlining of five-eighths inch common pine, laid longitudinally and well nailed to each carline. This, while protecting the sheet iron, would also add materially to the strength of the car. This of course is not generally followed up owing to the first cost, but the Northern Pacific has done so, with furniture cars particularly, and the results are most satisfactory. The application of metal roofs to old equipment I do not approve, for such, I think, is equivalent to putting new cloth into an old garment, and the suitability of such a roof should very largely depend upon what is most accessible at the lowest cost, and at the same time a good roof for the life of the car. Some railroads may be running through the great pineries of our country, and could make renewals of roofs for old cars with this class of material quite satisfactorily at a low cost; yet where such is used I would suggest that in all cases the material be dipped in a thin solution of mineral paint or creosote, the latter preferred.

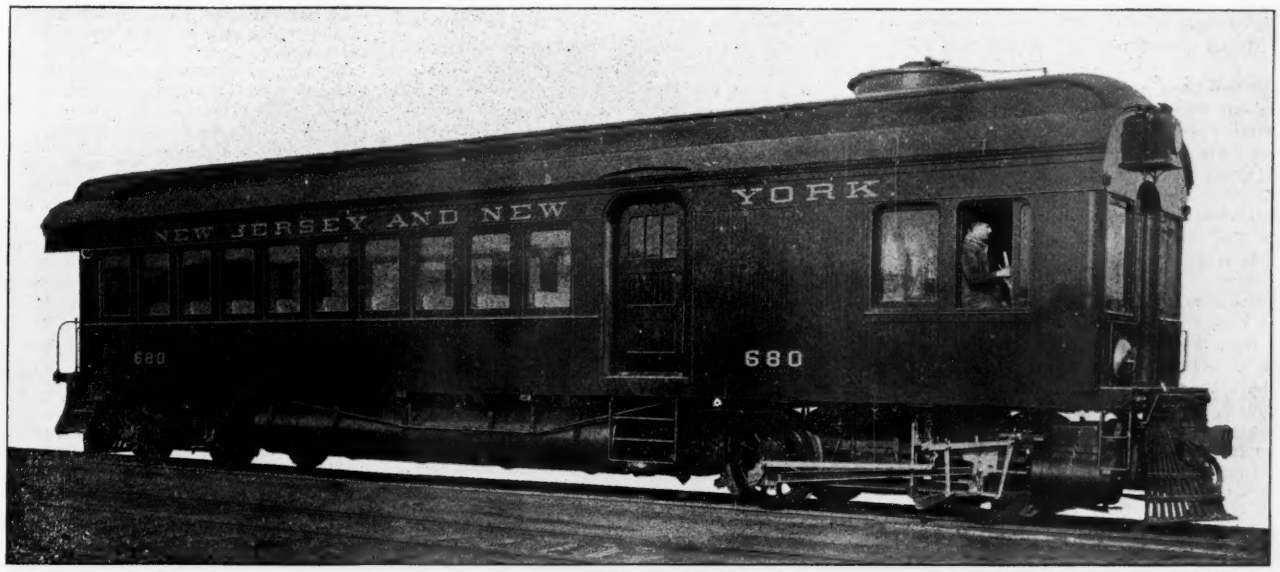
In the case of the plastic or asphalt roof we must build a foundation above the top of the carlines to receive it, and this, as I said before, is a stiffener to the roof, and many of our cars built ten or twelve years ago will require it to some extent owing to the weak condition of the framing. A plastic or asphalt roof laid loosely between points where it is secured to the roof is both profitable and suitable, but unless laid loosely and with an air space I believe the plastic roof in some measure is a mistake. With these roofs a very low grade of lumber may be used both above and below, and quite often in making renewals of roofs, where double boards were originally used, it can be made considerably cheaper, as very often the lower course is in fair condition and need not be disturbed, consequently the cost is reduced below that of a double board pine roof.

Lastly, I would mention two other roofs, viz.: tin and canvas. In my opinion neither is adapted to freight car service, owing both to their lack of durability as well as their great cost, if properly laid. Tin is an expensive roof, as owing to the contraction and expansion it is constantly requiring repairs; we find it a difficult and even costly roof to maintain in coach service, where every precaution is taken, by the use of mineral paint or lead; still there is a constant rusting out of the metal and breaking of seams and nails working loose.

Canvas roofs I consider as the best, excepting none, for passenger service, but as I said before it must be thoroughly and properly laid, and this practice, if followed out to the letter, makes it far too costly to consider its use in freight car service. Some have laid canvas in a manner similar to that in which some of our plastic roofs are laid, i. e., between the two courses of boards. This, in my opinion, is a mistake with any manufactured fabric for car roofing, as the material becomes punctured from end to end with the nails driven in the top course of boards.

All plastic, paper, or asphalt car roofs should be laid with an air space between, for it not only prevents the puncturing of the material with nails, but also adds length of life to the roof, and makes it easier and less costly to repair.

Mr. G. D. Brooke, Master Mechanic, St. Paul & Duluth Railroad: I would say that I am most decidedly in favor of the plastic roof, for the reason of the low grade of lumber which can be used and the cost of renewing, but there are plastic roofs and plastic roofs, leaving out methods of applying. The principal requirements are that it shall retain its plastic quality for at least ten years, and not be so plastic that under the influence of heat it will run, and that is a requirement for asphalt that is not reached except by the imported asphalt from the Island of Trinidad. I have seen no American asphalt that would not either harden or run. My objections to the metallic roof are its first cost, and that we have the element of rust to contend with, and if the bottom layer is not in good condition we have sweating and dropping of rust upon our flour and grain, which we have found objectionable.



A Steam Motor Car for the Erie Railroad (New Jersey & New York Division).

Built by the SCHENECTADY LOCOMOTIVE WORKS, *Schenectady, N. Y.*

A "Composite" Car for the Erie

The Schenectady Locomotive Works have recently furnished to the Erie Railroad Company a steam motor car for use on the New Jersey & New York Railroad, a line 42 miles long, doing principally suburban business, operated by the Erie. This car is now in regular service. The general appearance of it is shown in the engraving and a table of dimensions follows.

Schenectady Composite Car for the New Jersey & New York Railroad.

Gage	4 ft. 8½ in.
Fuel	Anthracite coal
Weight in working order	114,800 lbs.
" on drivers	74,900 lbs.
Wheel base, driving	8 ft. 0 in.
Diameter of cylinders	12 in.
Stroke of piston	16 in.
Size of steam ports	10 in. x 1 in.
" " exhaust "	10 in. x 2 in.
" " bridges "	1 in.
Slide valves (Walschaert gear)	American balanced
Greatest travel of slide valves	4½ in.
Outside lap " " "	¾ in.
Inside " " " "	Line and line
Lead of valves in full gear	Constant ⅛ in.
Diam. of driving wheels outside of tire	42 in.
Mat'l " " " centers	Cast iron
Tire held by	Shrinkage
Driving box material	Steeled cast iron
Boiler.	
Style	Circular upright, with steam drum
Outside diameter	Top, 63 in.; bottom, 52 in.
Working pressure	200 lbs.
Mat'l of barrel and outside of firebox	Carbon steel
Thickness of plates in barrel and outside of firebox—	1/2, 9/16 and 11/16 in.
Horizontal seams—	Double, with welt inside quadruple riveted
Circumferential seams	Single riveted
Firebox, diameter	45⅝ in.
" depth	47½ in.
" material	Carbon steel
" plates	thickness, 5/16 in.; tube sheets, ½ in.
" water space	3 in. to 3½ in. all around
" stay bolts	Taylor iron, 1 in. diam.
Tubes, material	Charcoal iron
" number of	318
" diameter	1¾ in.
" length over tube sheets	About 4 ft. 8½ in.
Heating surface, tubes	589.6 sq. ft.
" " firebox	53.3 sq. ft.
" " total	642.9 sq. ft.
Grate	Rocking, with finger bars, R. R. Co.'s style
Exhaust pipes	Single
Boiler supplied by—	Two Sellers Class "N" Improved Injectors
Water capacity—	Twin tanks under body of car, 700 U. S. gallons each
Engine equipped with one 16 in. star headlight.	
Magnesia sectional covering on boiler.	
Two 2½ in. Crosby side outlet safety valves.	
Westinghouse automatic air brake on drivers and car truck.	
One Gollmar bell ringer.	

Railroads in China.

Recent English and French papers contain long articles on the Chinese railroads, from which we give a few particulars, most of which are probably already known to our readers, or at least ought to be; but from the confusion of events and of geography in that far away country it is difficult to carry away accurate and lasting impressions. The sketch map is reproduced from The Engineer (London) of March 18. The existing railroads are shown northwesterly from Tien Tsin to Peking, about 80 miles, very recently opened, and northeasterly from Tien Tsin to Shan-Hai-Kwau and about 40 miles beyond that town. The little piece of this road from Tien Tsin to Kaiping is the one old Chinese railroad which a dozen years ago was the Kaiping Railway and later the Imperial Railways of North China. These are the existing railroads, amounting in all to less than 300 miles, including the bit of extension northeast from Shan-Hai-Kwau.

Sketch Map Showing Chinese Railroads.

Full lines show completed railroads; broken lines show projects.

The other lines are projects, and of these the most important is the air line south from Peking to Hankow, on the Yangtsze River. This is shown as a straight line simply because nobody (on this side of the ocean, at any rate, and probably nobody anywhere), knows exactly what the location of the line will be. This is the much disputed Belgian project. We have been informed that the concession has been granted, then that it has been annulled and again that it has been granted, and the last news that we have is an editorial article in Engineering (London)

saying that "after all, the contract has been settled and signed by the proper authorities and the construction of the line is left entirely in the hands of the Belgians."

This line, as we remember it, is to be about 700 miles long. A natural extension, which has been much talked of, is still southerly to Canton, which would make a trunk line of 1,400 or 1,500 miles. Such a railroad, together with the Yellow River and the Yangtse Kiang, would command the commerce of the richest and most populous part of China.

The line shown from Tien Tsin southeasterly to Kiao-Chou is a German project. Where this stands, either diplomatically or financially, we are not informed.

The line from Moukden northeasterly to Vladivostock and also southward from Moukden to Port Arthur is a Russian project, which also is still in the air, so far as we have been able to learn. Obviously, this is a line of great strategic importance in connection with the Russian ambitions in the East and also of some, although not great, commercial importance.

Still another line, which is not a project, but is actually built, is from Shanghai to Woosung, about 10 miles.

Mr. Leroy Beaulieu, writing in the Economiste Français, says that the prolongation of the northeasterly road from Shan-Hai-Kwau to Moukden, with a branch to New-Chwang, is advancing very slowly. He says that there are four trains a day each way running from Tien Tsin to Tangkou and two daily each way from Tangkou to Shan-Hai-Kwau and two from Tien Tsin to Peking. This latter statement sounds improbable. Considering that the distance is less than 80 miles between these two cities, and that Peking is a great city, and the capital, and that Tien Tsin is its port, and that the railroad was finished several months ago, it seems likely that there are more than two daily trains each way over that line.

The Long Island Railroad and the Brooklyn Elevated.

Among the plans for developing the property of the Long Island Railroad Company and making the most out of a system of railroad lines which seem to have great possibilities probably the most important are those plans which give improved terminals in New York and Brooklyn and which facilitate the movement of passengers between the centers of the cities and the beaches, summer resorts and suburban residence area. Of these plans one important one, namely, the tunnel entrance into New York City, is delayed by various interests, but we hope and believe only temporarily. Meanwhile a promising, indeed, we might say brilliant, scheme for immediate improvement has been carried out in making an agreement for joint working between the Long Island and the Brooklyn Elevated. Under this agreement the cars of the Long Island Railroad will run, some of them, to the eastern end of the New York & Brooklyn Bridge and some of them across to the New York City Hall terminus, reaching the bridge over the tracks of the Brooklyn Elevated. These cars will give continuous service, fairly rapid, between the bridge and Coney Island, the bridge and Broadway ferry and Rockaway Beach, and also between the bridge and the suburban country along the north shore of the island. All of this is important in that it will help to keep and to bring back to the road much of the dense summer travel.

What appears to be even more important is the fact that under this arrangement the main line traffic reaching Jamaica can be distributed to the City Hall station down town to Broadway ferries and to the Long Island City ferry up town; and later, when the New East River bridge is finished, an important traffic will go that way.

It will be seen at once that this arrangement has several decided advantages. In the first place the distribution of the travel is very important. Facilities must be provided now for the moment of maximum business at the Long Island City station and at Jamaica. Under the new arrangement the traffic congesting that terminal at this maximum moment will be divided between the Long Island City terminal and the Brooklyn Bridge and later the New East River bridge. Another important advantage will be the saving of time. For the down town travel the Long Island City terminus is not convenient. It involves an elevated railroad journey to 34th street and from 34th street to the ferry by shuttle train, or a long walk to the James Slip ferry and a long ferry passage to the railroad terminus. Under the new arrangement considerable time will be saved for people going to and from the lower end of New York City.

Furthermore, a decided improvement will be made in the means of getting to the beaches over anything now existing. Cars can be run through without change and in considerably less time than is now possible, and passengers on the through trains will have all transfer privileges on the elevated.

Of course the speed of trains on the elevated structure will be limited practically by the schedules of the way trains now running there, unless as traffic develops more tracks can be laid and express trains run. But even so, a material saving of time can be made over to the surface roads; and it must be remembered that the Jamaica-Flatbush ave. route will be 9.58 miles on the tracks of the Long Island, without stop, and only 1.2 miles on the elevated. Nevertheless, it is considered necessary for the final development of the property to have the underground route by which express trains can be run from the heart of the down town business district right out, at 40 miles an hour, to the main lines of the Long Island, beyond the restricting limits of city travel.

Connection will be made between the tracks of the Long Island and the elevated structures by inclines, which will be built at once, and it is now supposed that on some of the routes trains can be running in 60 days from this time, and on others in 90 days.

The agreement provides for joint operation, an interchange of rolling stock and division of receipts and expenses, and, as we have said, is for 50 years.

Obviously, one development of this project must be equipping all the lines operating in the region of dense and frequent traffic for electric working. This will be done gradually, probably, but as fast as money is provided, and with due regard to the development of the art. Perhaps no definite decision will be reached as to electrical equipment until the plans now developing on the Alley Elevated in Chicago are carried out to demonstrated success, although it is intended that one of the through routes shall be electrified very soon.

This scheme strikes us as being one of the most important projects for suburban working that has yet been undertaken. It has much in common with the plan for bringing the Evanston Division of the Chicago, Milwaukee & St. Paul into the heart of Chicago, but is complicated by more conditions and ramifications.

Some Recent Air Brake Decisions.

On the 30th of March Judge Lacombe, sitting in the United States Circuit Court, Southern District of New York, issued an order enjoining the Great Northern Railway Company from further use of certain New York Air Brake Co.'s equipment. The decision follows that of Judge Coxe issued Jan. 4 in the case of the Buffalo, Rochester & Pittsburgh, note of which appeared in our issue of Jan. 7. The Buffalo, Rochester & Pittsburgh was ordered to remove the infringing devices at a certain specified rate, but inasmuch as the Great Northern has a considerably larger number in use, and also a larger car equipment, it is required to remove the New York apparatus faster than was required of the Buffalo, Rochester & Pittsburgh. Judge Lacombe states that the total number of the defendant's freight cars is 16,000 and that the number equipped with the infringing devices is 3,200. He orders the removal of 500 brakes within sixty days from date of entry of the order. Further lots of 500 each shall be removed every thirty days until 2,500 have been removed, and thereafter 250 shall be taken off each thirty days.

The Great Northern moved to suspend the operation of this injunction, pending appeal. Judge Lacombe denied this motion April 1, but granted forty days additional time for the removal of the first 500 brakes.

The decision in the Great Northern case, as printed in full elsewhere in this issue, does not state specifically the claims involved other than that this is a motion for injunction based on patent No. 376,837.

Considering the importance of this whole matter, it may be well to briefly review the recent litigation. The suit against the Buffalo, Rochester & Pittsburgh was decided on the 4th of last January. A brief report of it may be found in our issue of Jan. 7. On Jan. 21 we published a statement from the New York Air Brake Company regarding this and a reply from Mr. H. H. Westinghouse appeared in our issue of Jan. 28. An extract from the order of Judge Coxe, as made in the U. S. Circuit Court at Utica, N. Y., Jan. 4, follows:

"Ordered, that a preliminary injunction issue . . . restraining the further infringement of patent No. 360,070, dated March 29, 1887, and No. 376,837, dated January 24, 1888, and particularly claims Nos. 1, 2, 4 and 5 of No. 360,070, and Nos. 1, 2 and 3 of No. 376,837 . . . but the operation of said injunction is suspended to enable the defendant to comply therewith as follows, viz.:

"The defendants shall remove at least two hundred and fifty of the infringing apparatus . . . within thirty days from this date, and at least two hundred and fifty more within sixty days from date, and at least two hundred and fifty more of such apparatus within ninety days from date, and the balance of all such apparatus within one hundred and twenty days from date.

"And it is further ordered that this suspension of the operation of said injunction is upon the further express condition, viz., that the defendant, thirty days from date, file with the Clerk of this Court a sworn statement showing that at least two hundred and fifty of such infringing apparatus have been removed and giving the numbers, or other designating marks, of the cars from which they have been removed, and a like sworn statement at the end of each thirty days thereafter, showing that at least two hundred and fifty more of such apparatus have been removed within each such period of thirty days until all have been removed; and all shall be removed within four such periods of thirty days.

"In case of failure . . . to comply strictly with the conditions of this order . . . the said injunction shall become immediately operative and in full force and effect."

The claims specified in this order have been sustained on several occasions, notably in the suits against the New York Air Brake Company, reported in our issue of Jan. 4, 1895. These claims are as follows:

Patent No. 360,070.

Claim 1. In a brake mechanism, the combination of a main air pipe, an auxiliary reservoir, a brake cylinder, a triple valve and an auxiliary valve device, actuated by the piston of the triple valve and independent of the main valve thereof, for admitting air in the application of the brake directly from the main air pipe to the brake cylinder.

Claim 2. In a brake mechanism, the combination of a main air pipe, an auxiliary reservoir, a brake cylinder and a triple valve having a piston whose preliminary traverse admits air from the auxiliary reservoir to the brake cylinder, and which by a further traverse admits air directly from the main air pipe to the brake cylinder.

Claim 4. The combination, in a triple valve device, of a case or chest, a piston fixed upon a stem and working in a chamber therein, a valve moving with the piston-stem and governing ports and passages in the case leading to connections with an auxiliary reservoir and a brake cylinder and to the atmosphere, respectively, and an auxiliary valve actuated by the piston-stem and controlling communication between passages leading to connections with a main air pipe and with the brake cylinder respectively.

Claim 5. The combination in a triple valve device of a case or chest . . . and a check or non-return valve interposed between the auxiliary valve and the passage leading therefrom to the brake cylinder.

The claims of patent No. 376,837 referred to are:

Claim 1. In a brake mechanism, the combination of a chamber or casing having direct connections to a brake cylinder and to a brake pipe, respectively, a valve controlling communication between said connections, and a piston or diaphragm which is independent of and unconnected with a triple valve piston and is actuated by pressure from an auxiliary reservoir in direction to impart opening movement to said valve.

Claim 2. In a brake mechanism, the combination of a chamber or casing . . . and a check or non-return valve controlling communication between said valve and the brake pipe passage of the chamber.

Claim 3. In a brake mechanism, the combination, with a triple valve, of a supplemental chamber or casing having passages leading to a brake cylinder and to a brake pipe, respectively, a supplemental valve controlling communication between said passages, a supplemental piston operating independently of the triple-valve piston and adapted to impart opening movement to said supplemental valve, and a passage establishing communication between said supplemental piston and an auxiliary reservoir.

The U. S. Circuit Court of Appeals, Southern District of New York, gave a final decision in the suit against the New York Air Brake Co. Oct. 15, 1894, restraining that company from further infringement of claims Nos. 1, 2 and 3 of patent No. 376,837 and declaring the first and second styles of brakes made by the New York Air Brake Co. to be infringements of these claims. The company brought out a third style, known as the "B" triple valve, and Dec. 27, 1894, Judge Lacombe enjoined the further manufacture of this triple. This case went to final hearing and Oct. 13, 1896, Judge Lacombe decided that this triple infringed the first claim of patent No. 376,837, and no appeal from this decision has ever been taken.

Propositions were made to railroad companies using the infringing valves for their removal and replacement by Westinghouse apparatus, and one of these propositions was accepted by the Buffalo, Rochester & Pittsburgh, which company, however, did not carry out its undertaking in this matter, and when the Westinghouse company learned that the Buffalo, Rochester & Pittsburgh had equipped 200 new cars with the fourth or "C" triple valve, made by the New York Air Brake Co., the suit was brought which was decided last January.

The Great Northern refused to enter into an agreement to remove the infringing valves, and in October, 1896, suit was brought against that company, and the result is recorded above.

Railroad Building in Finland.

Probably it has not occurred to many of our American readers to look to Finland as a market for rolling stock, yet with a population of less than 3,000,000 that country has almost 2,000 miles of railroad and considerable new building is about to be undertaken.

The Grand Duchy of Finland is 650 miles long (north and south) and 112 miles wide near the middle; the greatest width is 370 miles, in the southern part, and it abounds in lakes and small streams. Especially is this true of the southern portion, where the railroads have been built.

All the railroads are under government control and, with the exception of a few small narrow gage lines, used principally as connections between factories and main lines, are known as the Finland State railroads. The main line, between Riihimäki and St. Petersburg, was opened for traffic a little more than 27 years ago. Extensions from time to time have brought the present mileage up to 2,474 kilometers (1,537 miles) the last extension, known as the Jywäskylä branch, 78 kilometers (48 miles), having been opened last November.

At the last session of Parliament four extensions were authorized and these have been approved by the Grand Duke (Czar of Russia). The first will extend from Uleaborg, northwest along the coast to Tornea, on the border line between Finland and Sweden, and will eventually connect with the Swedish Government railroad, which is being built toward Tornea. Five bridges will be required to carry the road over as many streams, all of which must be built for use also as highway bridges. The estimated cost of the line is $1,747,100, of which sum $855,000 may be spent before the next meeting of Parliament. The second new line will be built from Kuopio north to Iisalmi, with an ultimate extension northeast to Kajana. (See map.) This latter extension has not been authorized, however. The estimated cost of the line to Iisalmi is $1,182,560, of which $760,000 may be spent before Parliament meets. The third extension is from Björneborg to deep water at Mäntyluoto, practically a suburb of the former place. Two hundred and twenty-eight thousand dollars have been allowed for this work, which probably provides for building terminal facilities, including wharves, at Mäntyluoto.

The only line now building is from Abo, southeast to Karis; this is nearly finished. A further extension from Karis, east to Helsingfors, the principal city in Finland, has been authorized, to cost $1,182,560, of which $380,000 are to be spent before the next session of Parliament.

Sketch Map of Finland Showing the Railroads.

Two other extensions have been proposed, which we have shown on the map. They have not yet been sanctioned by Parliament.

The Government has also voted $380,000 as subsidies for use of private companies in building narrow gage roads.

The annual report of the Finland State railroads for the year ending Dec. 31, 1897, has lately been published in abstract. The total income was $3,756,490, against $3,412,400 for the preceding year, an increase of $344,090 and against $2,953,740 for 1895. Earnings from passenger traffic increased as follows: First class, $5,966; second class, $52,250, and third class, $133,665. Total, $191,881. The increase in the number of passengers carried was: First class, 2,806; second class, 77,587, and third class, 798,616.

On May 1 of last year a reduction of rates on the Zone system, similar to that inaugurated in Hungary a few years ago, took effect. The increase in both freight and passenger traffic has since been greater than at any time previous.

The principal freight business is carrying lumber and butter and other farm products, much of which is exported.

The estimated expenditures for 1898 are given as $4,482,195, divided as follows:

Operating expenses	$2,669,200
New buildings	706,165
New rolling stock	1,041,196
Extras	65,634

The estimated earnings amount to $3,990,000, which would leave a deficiency of $492,195. This will be made up from funds maintained by the government for improvements in ways of communication.

The system now owns 253 locomotives (including the 22 just built by the Baldwin Locomotive Works) and provision has been made for buying 40 new engines within the next three years.

Naval Works at Key West and Dry Tortugas.

The Union Bridge Co. has taken a contract from the Government for work at Key West and Dry Tortugas consisting of one pier and two coal sheds at Key West and two piers and two coal sheds at Dry Tortugas, the whole amounting to $590,000. This work is for the naval depots at those places. The contract requires the work at Key West to be done in 170 days after the signing of the contract and that at Dry Tortugas in 180 days.

The description of the work, which follows, we take from the specifications sent out for bids, under which specifications the contract was made.

The foundation of the coal house for the naval station at Key West will be on piles, the rock being about 27 ft. below mean low water. The piles will be capped and floored under water and 9 in. of concrete will be put on this floor. The foundation walls will be of concrete with tie rods connecting the opposite walls, these tie rods to be coated with coal tar and blocked with timber to prevent sagging and relieve part of the strain due to settlement. Inside the walls the space will be filled with sand up to the level of the floor of the sheds, which floor will be 9 in. of concrete.

The coal shed will be in two bays side by side, with a row of columns in the center. The length of the shed between end columns will be 150 ft. and the width between centers of columns 100 ft. Longitudinally, the shed will be divided into 15 ft. panels. The columns supporting the roof trusses will be of two 10-in. channels, 15 lbs. per ft., and longitudinally along the tops of these columns will be a 12-in. channel, 20 lbs. per ft., on which the roof trusses will rest. Steel scantlings will be placed vertically between these columns, these to be 10-in. I-beams, 25 lbs. per ft. and to be spaced 3 ft. center to center. These I-beams are to be anchored into the concrete with 24 in. bolts. The sheathing of the sides and of the gable ends up to the under side of the roof trusses will be of ¼-in. steel plates 36 in. wide, fastened to the columns and scantlings.

There will be a glazed monitor roof and provision must be made for an overhead track suspended to the roof trusses, if it is found desirable on development of the scheme to use such a track. The roof purlins will be 6 in. channels 10½ lbs. per ft. The roof, the sides of the monitors and the gable ends down to the height of the bottom chord of the roof trusses will be covered with No. 20 galvanized, corrugated iron.

The wharf will be 304 ft. long and 48 ft. wide center to center of extreme piles with approach 464 ft. long and 16 ft. wide. The main wharf will be of steel with a yellow pine floor. The approach will be a wooden structure of yellow pine. The pier head will have steel piles driven into the coral rock about 8 ft. These will be in four longitudinal rows, 16 ft. center to center, and the piles in each row spaced 16 ft. These piles will be solid, 6 in. in diameter. All of these may be in two parts, the upper portion of all being of the same length. The two parts will be joined by a cast iron sleeve, the abutting surfaces of the upper and lower parts of the piles to be machined to true surface and the inner surface of the sleeve and the surface of the piles to be machined to an accurate fit. The floor beams resting on the cast iron pile caps will be 20 in. 64 lb. I-beams, and on these will rest floor joists of 9 in., 21-lb. I-beams, spaced 2 ft. 3½ in. center to center.

In the rear of this wharf will be a coal house 250 ft. long by 75 ft. wide, similar in all respects to the coal house before described.

At Dry Tortugas will be two steel piers and two coal houses substantially like those above described for Key West.

According to the plan, two elevators are to be installed on the present wharf at Key West with steel frames, hoisting engine, etc., for handling the coal. The specifications are not absolute with regard to the coal handling system. It may be done by tracks on the floor level or by overhead runways, and machinery for delivery of coal from the sheds into vessels or lighters must also be provided. The structural steel is to be open hearth with a tensile strength from 60,000 to 70,000 lbs. and an elastic limit of one-half the ultimate tensile strength and minimum elongation of 22 per cent. in 8 in., a reduction of area not less than 40 per cent. and must stand bending 180 deg. without sign of fracture to a curve, the inner radius of which equals the thickness of the piece tested; this cold, and also after being heated to a cherry red and quenched at 60 deg.

We said at the outset that this work must be done in 170 and 180 days respectively. The penalties for failure to conform to the time limit are $400 a day in the case of the piers and coal sheds and $200 a day in case of the coal handling machinery. The premium amounts to $500 a day for each day by which the completion of the work is advanced under the time specified at Key West and $400 a day at Dry Tortugas. For each day by which the entire completion of the coal handling machinery antedates the specified time $200 premium will be paid.

The account as given above is very much abridged from the specifications of the Government, and since it was written we learn that the contract for the coal handling apparatus has been let to the Brown Hoisting & Conveying Machine Co. This is an independent contract directly with the Government and covers four separate coal handling plants, two at Key West and two at Dry Tortugas. Each of these will consist of two Brown's patent bridge tramways with self-filling buckets of two tons capacity each, making eight bridges in all. The price is $151,000, which is $60,000 more than the lowest bid. This company has five months in which to complete its work.

The Dublin (Ireland) Electric Street Railroads.

Before the Institution of Civil Engineers in London Mr. H. F. Parshall lately read a paper on the Dublin Southern tramways. The installation as originally designed would not conform to the Board of Trade Electric Traction Regulations in the matter of the fall of potential in the earth return. The machinery had been ordered and the work proceeded with before Mr. Parshall was called in to advise. The problem became, therefore, to utilize as much of the machinery ordered as possible, and to install such other machinery as would be necessary to distribute the electricity under the Board of Trade rules.

The high tension alternate current method of transmission was considered most suitable. It was necessary to make use of the sites owned by the Tramway Company, and to execute the work as cheaply as was consistent with safe operation. The three-phase machines and switchboards were specially designed for the installation which was the first one of its kind established in the British Isles. The installation has been in operation for nearly two years and has been found entirely satisfactory. The operation of the sub-stations is so simple that only a boy is employed in each station to run the machinery. Owing to the low frequency the motors are easily synchronized, and even though they are thrown in considerably out of phase they quickly fall into step. Since the opening of the road the load has been greatly increased by a considerable number of additional cars and trailers, yet the machines have given no trouble and the synchronous motors have not fallen out of step even with the most severe loads. The requirements of the Board of Trade have been satisfactorily met, and owing to the number of points of distribution, it is possible to work some 60 cars on the line instead of 20 as originally designed to comply with the Board of Trade regulations. As originally designed the fall of potential in the earth return would have been some 18 to 20 volts, whereas in the present installation it is 3½ volts.

The efficiency of the machines in the sub-stations is not so high as would be the case with larger machines and large rotary converters.

The Belgian Railroad Minister is said to have ordered that during the fine season a baggage car fitted for carrying 32 bicycles shall be attached to all trains most patronized by wheelmen.

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

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It has been suggested that the Master Car Builders' Association recommend or adopt a standard test for car axles and couplers, for which there is need. The subject has again been brought up by a paper on coupler tests presented by Mr. Gustav Giroux of the Chicago, Burlington & Quincy, at the March meeting of the Western Railway Club, portions of which paper are reprinted in this issue, in which several facts are brought out of considerable importance. Thus, while it is quite generally known that rigidity of the upper portions as well as of the foundations of a coupler testing machine is a necessary quality for good work, and a few excellent drops have been built to conform to these conditions, it is not widely known that the best facilities for testing may give unreliable results. Mr. Giroux shows that even with a properly built drop, by using an elastic blocking, such as wood, to hold the specimen in position, an inferior coupler may be made to show results which compare favorably with those given by the strongest couplers when held by iron blocking. It is evident, therefore, that in specifying a coupler test, definite requirements should be made as to the construction of the drop, the weight used and the manner of holding the couplers firmly in the machine with metal blocks. The specifications given in the paper will probably not be acceptable to all as they propose a smaller number of blows for malleable iron than for steel couplers, and the reasons for this are not very clearly stated. Upon first thought, it may seem improper to so favor malleable iron, as all couplers of whatever material they may be made are subject to the same shocks in service; there is, however, more than one factor to be considered. If the drop test represented conditions corresponding to the maximum which will be likely to occur in actual service, and there were no other considerations, it would appear that the requirements of the tests should be the same no matter of what material the coupler is made. If, however, the single test should be such that the best cast steel would be required, it would be a difficult matter to make couplers of malleable iron which could be accepted, while on the other hand to make the test requirements such as to admit good malleable iron couplers would remove all incentive for the maker of steel couplers to furnish good material. As couplers of good malleable iron have been found to give satisfactory service, and as the cost of malleable iron is considerably less than steel, a factor is introduced which almost prohibits the establishment of a single test so long as there is a demand for both malleable iron and steel couplers. While railroads use both materials so largely for couplers, it is doubtless best to have the test requirements for one differ from those of the other, so as to insure not only the best malleable iron, but, if a stronger coupler is desired, the test requirements will be such as to compel the maker of steel couplers to furnish as good material as possible. In this way the moral effect of the drop test will tend to stimulate all manufacturers alike, which is really its greatest value. Mr. Giroux in selecting three blows of a 1,640-lb. weight from 3 ft. and six from 5 ft. for cast steel, and three blows from 3 ft. and three from 5 ft. for malleable iron has evidently not placed the limits unreasonably high, yet good material will be necessary to fulfill such requirements.

French Railroad Fares—Travel and Returns.

The reduction of fares on the French railroads which went into effect April 1, 1892, has been often mentioned in these columns. It applied chiefly to the two lower classes. Recently published statistics make it possible to show the effects of this reduction.

The average receipts per passenger per mile for six years, including two years before and three years since the change, have been in cents:

1890.	1891.	1892.	1893.	1894.	1895.
1.364	1.349	1.225	1.186	1.194	1.186

Thus the reduction on the average has been 12 per cent., which is much less than in some other recent changes in fares in European countries, especially in Hungary and Russia. The slight reduction in first-class fares has something to do with this.

The aggregate passenger traffic, in millions of passenger miles, has been:

1890.	1891.	1892.	1893.	1894.	1895.
4,933	5,146	5,742	6,216	6,416	6,619

The stimulating effect of the reduction was felt immediately, though not all the growth of travel may be attributed to it. Traveling was increasing, and quite rapidly, under the old rates, as we see above a growth of 4 per cent. from 1890 to 1891. But at that rate of growth the travel would have been only 5,587 million miles in 1893, instead of the actual 6,216 millions, and the difference, 619 millions, we may credit chiefly to the lower fares. But these seem to have had their full effect all at once. The increase in travel, which was 213 millions from 1890 to 1891 (under the old fares), was but 200 millions from 1893 to 1894, and 203 millions from 1894 to 1895.

There has been a constant increase in the mileage of the French railroads since 1890, and so far as this has had an effect on travel, the stimulus of lower rates has been less. But the lines opened in France of late years have a traffic so very much less than the average of the old lines, that their effect on travel might be neglected. Nevertheless, we give below the average density of passenger movement for the six years, the following being the average number of passengers carried each way daily on the whole French system:

1890.	1891.	1892.	1893.	1894.	1895.
327	331	363	388	392	403

Thus the density of travel increased 17 per cent. from 1891 to 1893. The average journey has decreased; it was 20.04 miles in 1890, and 19 miles in 1895.

The effect on passenger earnings is shown by the following statement of their total amount in the several years:

1890.	1891.	1892.	1893.	1894.	1895.
$67,753,145	$69,943,272	$71,994,070	$75,117,529	$77,779,240	$79,741,684

The percentage of growth from year to year in consecutive years has been 3.24, 2.88, 4.50, 3.54 and 2.52—that is, just about the same before as since the reduction, so that it may be said that the gross passenger earnings of the railroads have not been affected by it one way or the other. That their profits from this traffic have not been changed is not so plain. In 1895 they carried 34 per cent. more traffic than in 1890 for 18 per cent. more money. If the increase of 1,686 millions of passenger miles was carried at an additional expense no greater than the $11,988,539 increase in passenger earnings, then the cost per passenger mile for the addition was not more than 0.704 cent, which is possible in some European countries and perhaps in France. As, however, travel, earnings and profits were increasing under the old fares, and judging by the past the gross passenger earnings of the French railroads would have been as great in 1895 without change of fares and with an increase of travel about one-fourth less, it is probable that their profits are a little less than if the old fares had been maintained. The difference, however, cannot have been very great; and the benefit to the public has been material.

Railroad Legislation in Massachusetts.

The present Massachusetts Legislature has passed a law to help the Boston & Maine retain control of its leased lines. This law, with the discussion drawn out during its passage, affords an interesting illustration of the workings of governmental regulation of railroad corporations in that state, and is another evidence of the enlightened character of the railroad policy of Massachusetts. While closely scrutinizing every proposal from corporations which might infringe the rights of the people at large, the state refrains from putting severe restrictions on the railroads simply to please the populistic view that they ought to be repressed because they are large corporations. Massachusetts established its Railroad Commission in 1869, and the chairman of the board, being a trained publicist and an expert, at once began to exert an influence throughout the country, and this influence continues. The three decades have not all been full of important matters and the Commission has not always been composed wholly of strong men; but in the last few years the activities of the board have had to do with many important transactions, and the value of such an agency, both to the people and the railroads, is more apparent than ever. The annual reports and other published utterances of the board have been examples of fair-mindedness; and, so far as can be judged from the tone of written documents, the man or men who wrote these reports must have been actuated by high public spirit. The reputation of the present members sustains this view. But the railroad policy of the state depends, of course, on the intelligence and the spirit of its Legislature as much as upon the Commission, if not more, and it is the Legislature that we now have more particularly in mind. Legislatures seem to have been deteriorating all over the country during the past 25 years, and Massachusetts has not been exempt from the scourge of large majorities, made up of men of mediocre minds or corrupt motives; but the Boston & Maine discussion gives evidence that public spirit still retains some vigor down that way, and that the Bay State has not descended to nearly so low a level as have some states that could be named.

The Boston & Maine discussion emphasized two things: (1) That the value of the excellent laws of Massachusetts regulating the financial conduct of railroad and street railroad corporations depends upon the integrity, intelligence and fearlessness of the Railroad Commissioners, and (2) that in the present Legislature reason prevails. The first conclusion is seen to be necessary when we reflect that only with an independent and courageous Commission can the public be assured that railroad capital shall not be unduly inflated or the railroads be free from the unreasonable annoyances of critics with populistic minds. The Commission decides how much stock may be issued for any given undertaking and is responsible for making a fair estimate of the probable cost and value of new works or improvements of old ones. To those who expect a government to run like an automatic machine, without care, it may not be very comforting to reflect that the appointment of two weak men as Commissioners may at any time open the door in Massachusetts to the corporation abuses which flourish where speculative financiers have everything their own way, or may retard progress by introducing unwise counsels; but where is the state or the organization that does beneficent work except through the instrumentality of strong men? The second conclusion follows from the fact that the objectors to the Boston & Maine bill, though actuated by the best of motives, were beaten by fair argument. Several sessions were given up to the discussion and all sides were heard, but there was a large majority in favor of the bill.

The peculiarity of the bill was that superficially it looked like a stock-watering scheme, giving rise to vague fears among the people's watch dogs that a great scheme of consolidation and inflation was hidden beneath the surface, whereas in fact it was a provision for legitimate contingencies of the future; so far, indeed, in the future that the president of the road said at the legislative hearing, when asked what he intended to do under the law, that he did not know. This frank answer only served to alarm the objectors more than ever. From the abstract of the bill given in the Railroad Gazette of January 21 (page 51) it will be recalled that it simply provided (though with somewhat unusual restrictive and penalty clauses) that the Boston & Maine might buy shares of new stock hereafter issued by any of its controlled companies without having such shares sold at public auction, provided the Railroad Commissioners approved the whole arrangement—the price of the shares bought and the amount of B. & M. stock issued in exchange. The objectors were greatly puzzled by their inability to see any legitimate purpose in the proposed law. They could readily see that the Boston

& Maine might want to secure a more complete control, for instance, of the Boston & Lowell or the Connecticut River; but as holders of shares in those controlled companies, sure of a good dividend as long as the Boston & Maine can pay it, are, of course, unwilling to sell, what could President Tuttle be driving at?

It was on fears of this kind, and the general argument that everything tending to perpetuate a high income for the stock of any part of the Boston & Maine's lines ought to be condemned, that the whole argument was based. It was contended that the state should not legislate for a purpose which, to some of the members, was inexplicable. But those who scrutinized the bill a little more closely were completely satisfied by the provision forbidding the Boston & Maine to get from lessor roads any modification of leases without the consent of a majority of the lessor company's stock, exclusive of the new stock to be issued under this law, and the objectors were beaten. The proviso forbidding the Boston & Maine to sell or hypothecate the purchased stock also strengthened the law.

We notice this bill because it is the embodiment of what seems to be a fair and reasonable arrangement between a large company and its subsidiary corporations for perpetuating a legitimate control while affording reasonable safeguards against illegitimate enlargement of such control. In some of its important leased lines the Boston & Maine has no ownership, and any breach of the leases would give the stockholders of the leased lines a chance to take the roads out of the Boston & Maine system. It is very improbable that such dismemberment would be for the public interest and therefore the state may fairly aid the Boston & Maine in strengthening its control. But there is no chance to buy stock from the present individual holders except on their own terms, and therefore the only way of improving or even of perpetuating the present status is to provide against an increase of alien control whenever it shall become necessary to issue new stock, and that is just what this law does.

Practically all roads have to grow, and sooner or later have to issue new stock, and the requirement that all new stock shall be sold at auction simply introduces a troublesome and probably harmful element of uncertainty as to control every time it is necessary to make important improvements or extensions. In the Maine Central, the Boston & Maine has a majority ownership, but does not lease or operate the line. If it is for the public interest to have consolidated control it is very unlikely that it would be beneficial to require the controlling company to fight for its rights every year or two. If consolidated control is not for the public interest, let the Legislature find out what the evil is and deal with the question on its merits. If a large majority of the stock of, say, the leased Boston & Lowell should at any time be found hostile to the Boston & Maine the latter might, indeed, have a fight on its hands to get additional stock issued even when needed and after the consent of the state was obtained; but the law could do no harm and it would give the lessee only a reasonable advantage.

Consolidation is in itself a blessing. If a consolidation produces incidental results inimical to the public interest the trouble should be located and the cure applied. The objectors to the present scheme professed to fear a future increase of dividends, and, in fact, seemed to look upon that charge as the foundation of their argument, though they did not make it prominent in their speeches. But direct limitation of dividends seldom if ever produces the public benefits expected from it, and efforts made indirectly, with the same specific object, are not likely to be any more successful. If railroad stockholders ever get rich too rapidly out of the profits which they make in carrying freight and passengers, the Legislature, if it has a duty in the premises, had better address itself directly to that phase of the question which most immediately affects the public, the rates charged for transportation. When Massachusetts newspapers attempt to argue about the danger of future 8 per cent. dividends they fail to produce anything practical; if they would confine themselves to fares and freights they would stand a better chance of keeping on solid ground.

The Railroad Commission of North Carolina, by a vote of two to one, has rescinded its order to reduce passenger fares throughout the state and the existing rates stand, though the Commission at the same time passed an order requiring the issue of 2,000-mile tickets at two cents a mile, good for the bearer. Chairman Caldwell voted to reduce rates and then changed his mind. It is impossible to form an opinion as to the wisdom of his action, for the two-cent rate on transferable 2,000-mile tickets, which the Commission has ordered, may prove a very unfair reduction of the railroads' income; but his professions sound sincere. He says:

"My vote on the passenger rate question has given me the gravest concern. Upon calm reflection I feel it was wrong. . . . I will have the approval of my conscience, but the disapproval of those unacquainted with the evidence before the Commission. . . . When the railways, by legal evidence, made it appear that reduced rates would not be fair and reasonable, and would result in loss to the roads, I could not feel that true judgment had been rendered in accordance with the evidence."

Knowing the Governor will be displeased, he sends his resignation. The Governor, on receiving it, made a speech saying that the absence of evidence to contradict that of the railroads was not a satisfactory reason for changing.

"If the Commission must wait or hunt around for evidence in railroad reduction cases and take everything as true, then there will never be any reduction. Unfortunately, the Commission has no counsel to get evidence, and all hearings are substantially ex parte. . . . The Nebraska case I believe to be a premeditated decision, rendered for the express purpose of emasculating the Railroad Commissions of the United States. I think our Commission and courts ought to give to that ruling the same kind of respect and obedience that was rendered by the anti-slavery party to the Dred Scott decision. . . ."

It is, indeed, unfortunate that there is no counsel to gather evidence, but to have a Railroad Commission which is willing to act without evidence is a still greater misfortune to the state. And from the speech which we have sampled most people will conclude that North Carolina is unfortunate in her Governor also. And what will the Populists say of a rate reduction on mileage tickets, which favors the rich at the expense of the poor?

Ohio is another state where the movement for universal low passenger fares seems to have been abandoned in favor of a mileage-ticket law. The bill introduced in the Legislature of that state two or three months ago has been amended so as to require only mileage books, but they must be good for a family or a firm, and be sold for 500 miles—that is, for only $10 each. The bill has been approved by both houses and the newspapers seem to think that, in this shape, it will be acceptable to the railroads. If that is so, it is probably because they have chosen to put up with the lesser of two evils. Mileage tickets shrink the railroad's earnings without satisfying the class of people who most need a reduction and who would probably most quickly repay the railroad for lowering single-trip fares by increasing the number of their journeys. A somewhat unusual incident in connection with the discussion on the original two-cent bill in Ohio was the presentation in the Senate of papers signed by over 30,000 persons, remonstrating against the passage of the bill. Probably these remonstrances were started, in many cases, by railroad men, but it is stated that the majority of the signers were not railroad employees. The New York Legislature, which passed a two-cent mileage law a year or two ago, has this year passed an amendment requiring 500-mile books to be sold at the same rate, but the Governor has not yet signed it. If this "strike" is successful, 200-mile books will probably be the next cry, and so on down.

Major General Hutchinson, the veteran inspector of the British Board of Trade, has lately acted as Arbitrator in a question about demurrage for freight cars. Complaint was made by the Manchester & Northern Counties Traders' Association against the Midland and five other important railroads, alleging that a charge of 6d. a day after the fourth day is excessive. The Arbitrator decides that the rate should be 6d. for the fifth day, 4d. for the sixth day, and 3d. for each subsequent day. If we assume that English cars have an average capacity of 10 tons, we shall have to multiply these figures by two or three in order to see how the rates would apply to an average American car. The highest rate would therefore be not more than 36 cents a day for one of our cars, or about one-third of what we actually do charge. So low a charge would be less than the actual worth of the car in most cases in this country (except when business is so dull as to leave a part of the cars idle), but it might be considered whether a reduction might not reduce friction. The very long free time allowed by the English roads seems to indicate that the pressure from traders is strong. In this feature we can probably teach the English roads instead of having to learn of them; but where many demurrage bills have to be remitted because of the difficulty of collecting them, or the free time is too long, a modification of our dollar rate might prove profitable. It might perhaps be more business like, and more equitable to all parties to charge 50 cents a day after the first day than $1 a day after the fourth. We cannot see the justification for General Hutchinson's reduction to 3d. after the sixth day. If cars were legitimate storehouses it would be fair to apply the wholesale principle for long terms, but as long as the root idea of demurrage is a penalty for wrongful use of cars, the rate ought to increase rather than decrease as time goes on. Perhaps in this case the reduction of the rate is meant to punish the railroad for not unloading the freight and putting it in a storehouse.

Although every American is supposed to have had a large accession of courage since the prevalence of the war with Spain, there is one kind of timidity which seems to be as deep-seated as ever—the propensity to throw upon some one else responsibility for unpleasant orders. The Interstate Commerce Commission has just called to account a certain "eastern carrier" for throwing upon the Commission the responsibility for the imposition of a storage charge on freight. It will be remembered that in deciding the free storage case recently, wherein the warehousemen of New York and other cities complained that storage charges were unequal and discriminating, the Commission directed all the railroads in the country to take care, after April 1, to make these charges equal to all persons, and to publish them. But the railroad which is now admonished issued a circular stating that "in accordance with an order of the Interstate Commerce Commission . . . freight unloaded into stations must be removed within 24 hours," etc., thus plainly conveying the impression that the storage charge after 24 hours was made because the Commission had ordered it to be made; whereas, of course, the road could, if it saw fit, continue to give a month's free storage, as in the past. The Commission informs the General Freight Agent that "Fixing the time of free storage was the voluntary act of your company and the circular referred to should be promptly corrected so as not to convey a contrary impression." Many of the best traffic managers welcomed the investigation which the Commission made into this subject; but whether it is possible, even with the best disposition, to do away with all the discriminations that the storage feature gives rise to is another question; we shall have to wait and see how the new rules work.

To make the Siberian Railroad successful it is necessary that the country through which it runs should have not only natural resources, but people—and it has very few now. To encourage the emigration of peasants from European Russia, the government has established a scale of emigrant rates which are probably the lowest regular railroad rates ever made. Beginning with a fare of $1.50 for a distance of 1,200 miles, which is a reduction of 26 per cent. from the previous emigrant third-class fare, for 2,000 miles the fare is $2.10, and for 4,000 miles $3.60. The percentage of reduction from previous rates grows greater with the distances, and for 4,000 miles is 60 per cent. As yet, however, there is probably no 4,000 mile journey possible. There is also a reduction on emigrants' freights, but these are not so considerable, and they are strictly in proportion to distance, amounting to 25 cents per 100 lbs. for 1,200 miles, 41⅔ cents for 2,000 miles, and 83⅓ cents for 4,000 miles. As a Russian peasant has difficulty in accumulating a few dollars, the removal of a family and the necessary goods and stock to begin farming in a new country would be beyond the means of the most of them at anything like ordinary rates; and if they can be induced to emigrate by the new fares, it is very likely wise to make them; for it is solely from this class that Siberia can be peopled and developed.

The efforts to encourage the grinding of Russian grain in Russia by making export rates less on flour than on grain have not been very successful. The total exports of flour, which averaged 1,906,000 barrels per year for the four years ending with 1888, averaged but 1,603,900 bushels for the four years ending with 1896; while in some of these years more than 100,000,000 bushels of grain were exported. The foreigners prefer the Russian wheat and rye to the Russian flour. Great milling establishments of modern design have been established meanwhile, but their product has gone chiefly to supply the home market. Recently the millers have complained so much that the authorities have determined to favor flour exports still more, and have made the railroad rate on flour exports 20 per cent. less than the grain rate, and have granted a rebate of 15 per cent. on grain going to mills on the border or at seaports to be ground. The shipment of a barrel of flour from the extreme east of Russia to the Baltic for export by this tariff costs 34 cents less than the shipment of wheat enough to make it.

NEW PUBLICATIONS.

Digest of Railway Decisions. By Stewart Rapalje and William Mack. Vol. 8. Edward Thompson Co., Law Publishers, Northport, L. I., N. Y.

We are in receipt of the eighth and last volume of Rapalje and Mack's Digest of Railroad Law embracing topics from "Trial" to "Year." The subjects most voluminously digested are "Trial," "Witnesses," "Waters and Watercourses," "Words and Phrases." The greater part of the volume is taken up with a table of cases and a general index to the entire work. The whole work is a most valuable addition to the literature of railroad law.

TRADE CATALOGUES.

Inspection Cars.—The Railway Cycle Manufacturing Company, Hagerstown, Ind., has issued an illustrated pamphlet of twenty pages describing the Hartley & Teeter light inspection cars. The frames of these cars are made of cold drawn seamless steel tubing, after the manner of a bicycle, ball bearings being used throughout. The wheels have steel wire spokes with rubber covered rims. The cars are driven by cranks and a sprocket wheel, connected to the rear axle by a chain. The single car weighs 60 lbs. and the double-seated car 75 lbs. It is stated that a speed of from 15 to 20 miles an hour can be easily maintained. A large number of these cars are now in use, and the pamphlet contains letters from some of those who have used the cars for several years with good results.

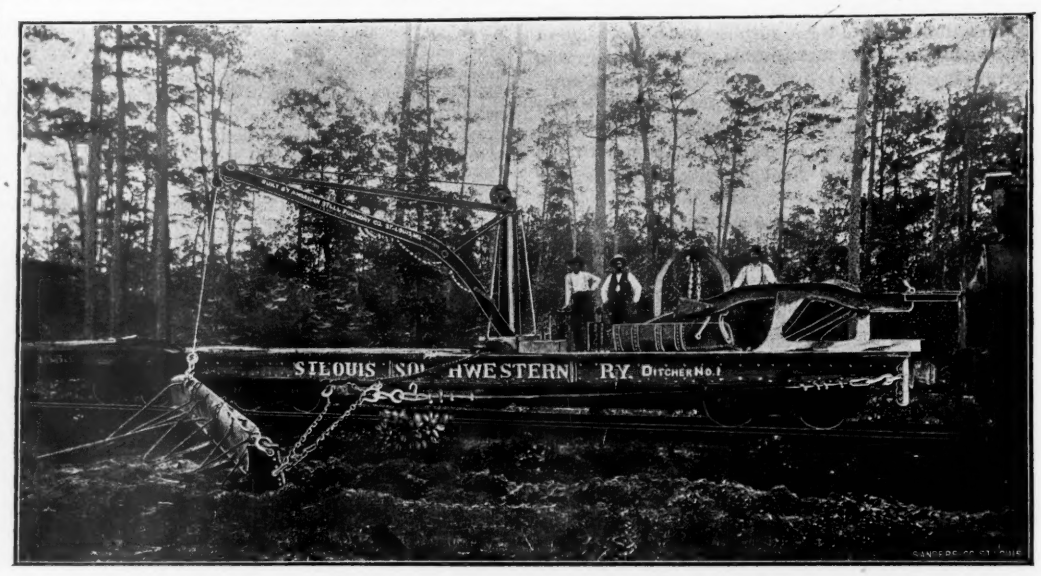
Inspirators, Ejectors, General Jet Apparatus and Other Specialties.—The Hancock Inspirator Co. of Boston, Mass., has just issued a new catalogue and price list of locomotive inspirators and ejectors, general jet apparatus and specialties for steam, water, air and gas. Considerable space is devoted to description and illustrations of the Hancock locomotive inspirator. The Hancock inspirators applicable to stationary, marine and portable boilers are also described.

Oil Tanks, Etc.—We are in receipt of two pamphlets from S. F. Bowser & Company, Ft. Wayne, Ind., makers of oil tanks and oil handling apparatus. One of these contains descriptions and illustrations of various styles of oil tanks and oil pumps, some of the tanks having automatic registers, which show the amount of oil in the main tank and also the amount delivered by the pump. A special pump and tank is made for use about railroad and other shops. The second pamphlet gives the history and growth of this firm from its establishment in 1885 with numerous illustrations.

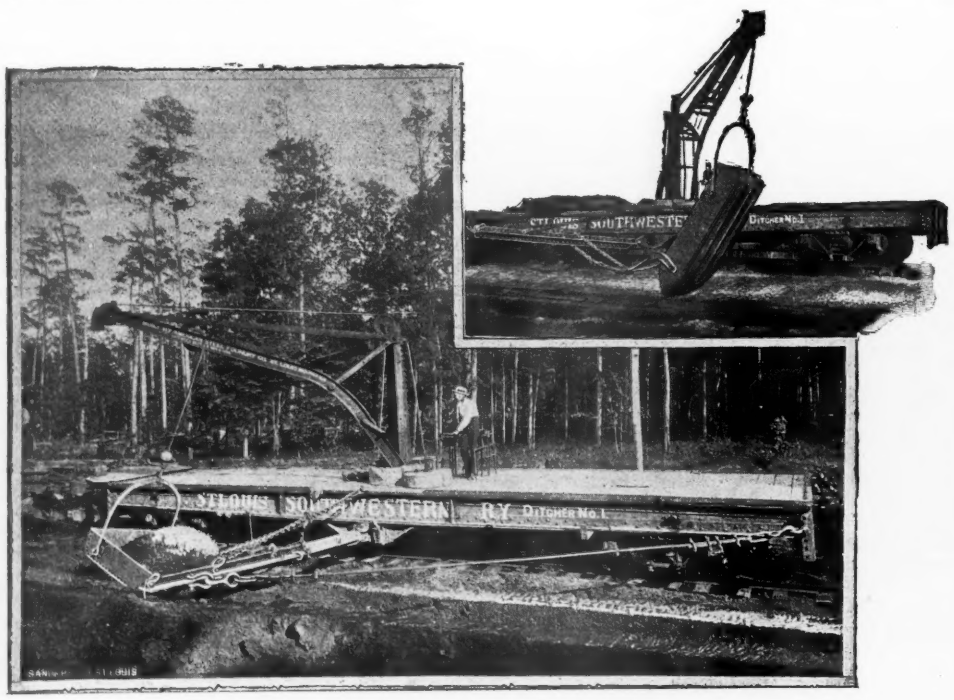
Gasket Tubing.—The Boston Belting Co., 256 Devonshire street, Boston, Mass., is placing on the market a new gasket tubing known as Excelsior gasket tubing. It is made from the same compound as the Phoenix red packing made by the same company, and the claims, as stated in a little circular just received, are that it is not quickly affected by great heat, will not blow out under the highest pressure and will make a perfectly tight joint no matter how rough or uneven the surfaces, and as it retains its elasticity for a long time, the same gasket tubing can be used repeatedly where joints must be frequently broken.

The "American" Compressed Air Ditcher.

In our issue of Dec. 24 last we described the construction of the railroad ditcher built by the American Steel Foundry Company, St. Louis, from designs of Mr. W. B. Doddridge, General Manager of the Missouri Pacific Railway, the main operations of which are performed by means of compressed air. The accompanying illustrations show the machine at work, and as a very complete description has already been given, it is only necessary at this time to state that in ditching the plow is first used. In cuts where there is not room for the surplus earth to be thrown off at the side the plow is followed by the scoop, and in certain cases it is convenient to make use of the scraper. The shoulder former completes the work with the exception of ballasting. This machine has given satisfactory service, and fully meets the expectations of Mr. Doddridge and the builders.



American Compressed Air Ditcher—Scraping.



American Compressed Air Ditcher—Scooping.

English and American Freight Cars.

The old question whether the large American freight cars could be used advantageously on English railroads has been lately discussed in a London paper. One correspondent, Mr. Joseph Price, Vice-President New York, Ontario & Western, thinks there is not much doubt that the concentration of the load of freight in American trains leads to greater economy in working, and quotes a test experiment with which he was connected and which was made for comparative purposes some four years ago by hauling a coal train on the New York, Ontario & Western, from Middletown to Weehawken, and on the London & North Western from Rugby to Willesden, the distance being exactly 77 miles in each case. (See the Railroad Gazette March 30, 1894, p. 225 for a full account with profiles, etc.) The total weight of the English train was 852 tons and that of the American train 919 tons, the paying load per cent. being 51.71 and 61.11, respectively. The English train was 1,263 ft. long, and the American 857 ft. The former had 130 axles and the latter 109.

Although the main facts told in favor of the American system, there were two or three points which went to prove that the American system cannot be used in England. The American cars, says Mr. Price, are 12 tons in weight with a load of 30 tons of coal, but the cars capable of being used for such heavy tonnage have to be wider than English wagons. The bodies of the American cars partly overhang the permanent way, and to introduce this system into England, bridges and tunnels would need widening and English turntables would be too short.

A Mr. Urban Broughton, who joins in the controversy, refers to Indian lines. In India, he says, there is no difficulty in running merchandise and coal trains of a gross weight of 1,000 tons, the dead weight being about one-third. There are many wagons of 20-tons capacity, but they are not suitable for small stations where there is no switching engine. The limit is in the length. If English railroads can run Pullman cars, they can run goods wagons of equal length without alteration of bridges and tunnels; but the cost of altering turntables, lifts and sidings is sufficient to prevent English roads from adopting long merchandise wagons.

Another writer considers it has been clearly shown that when the traffic on the lines is sufficient, traders would be willing to put the lifts, turntables and sidings right, provided they could get the larger wagons. He complains that there are colliery owners and ironmasters who are moving hundreds of thousands of tons of minerals every year, and who are constantly refused by the railroads the privilege of providing for themselves a supply of large trucks.

The Dominion Railroads and Canals.

The annual report of the Dominion of Canada Department of Railways and Canals for the fiscal year ending June 30, 1897, is a bulky volume of nearly 600 pages, in the familiar blue cover of British public documents. It contains many maps and tables and much data of particular interest to the student. The summaries show that the number of railroads in actual operation, not including the three Government roads, was 139, of which 27 have been absorbed by amalgamation with other companies, and 31 have been leased, making 81 controlling companies. The number of miles completed at the end of the year was 16,687, an increase of 300 miles. The leading statistics are contained in the following table:

Miles of railroad completed (track laid)	16,687
Miles sidings	2,218
Miles iron rails in main line	210
Miles steel rails in main line	16,477
Miles steel rails in main line, double track	550
Capital paid (including the four following items)	$921,858,232
Government (Dominion & Provincial) bonus paid	$159,241,584
Government (Dominion & Provincial) loans paid	$21,569,149
Government (Provincial only) subscription to shares paid	$300,000
Municipal aid paid	$15,610,868
Miles in operation	16,650
Gross earnings	$52,353,276
Working expenses	$35,168,665
Net earnings	$17,184,611
Passengers carried	16,171,338
Freight carried (tons)	35,300,331
Train mileage	45,780,851
Passengers killed	7
Elevators	93
Guarded level crossings—public roads	163
Unguarded crossings—public roads	11,239
Overhead bridges	421
Level crossings of other railroads	230
Junctions with other railroads	327
Junction with branch lines	219
Engines owned	2,006
Engines hired	90
Sleeper and parlor cars owned	189
Sleeper and parlor cars hired	37
First class cars owned	1,047
First class cars hired	37
Second class and immigrant cars owned	684
Second class and immigrant cars hired	4
Baggage, mail and express cars owned	663
Baggage, mail and express cars hired	11
Cattle and box freight cars owned	34,939
Cattle and box freight cars hired	2,532
Platform cars owned	15,149
Platform cars hired	203
Coal and dump cars owned	4,831

The Government roads consist of three, the Intercolonial, 1,145 miles; the Prince Edward Island, 211 miles, and the Windsor branch of the Intercolonial, 32 miles; the latter is maintained by the Government, but operated by the Dominion Atlantic. The gross earnings of the Government roads amounted to $3,060,074 and the working expenses $3,177,269, showing a net loss for the year of $117,205.

In the matter of subsidies the report shows that from 1883 to the close of the fiscal year 1897 the amount of ordinary subsidies was $13,365,637. Besides

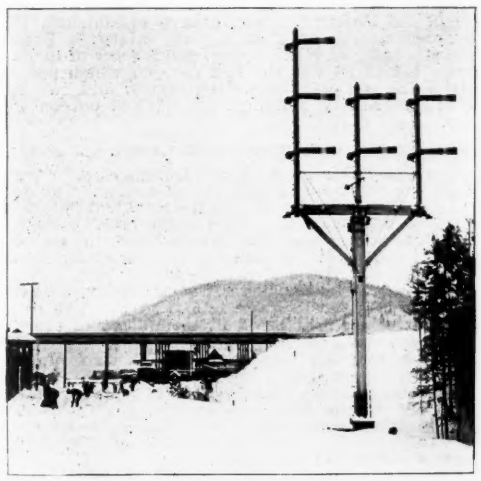
this there were exceptional subsidies, including $26,500,000 to the Canadian Pacific, which bring the total subsidies up to $41,390,887. The entire Government expenditure on the railroads prior to and since the date of federation (1867), including the above subsidies, amounts on capital account to $139,335,406. In addition there has been expended since federation for working expenses $69,522,382, making the total cost of the roads $208,857,788, all of which, with the exception of $13,881,261, has been expended during the past thirty years. The revenue derived from the Government roads during the same period amounts to $61,196,803. This shows a net loss in expenses over receipts of $8,325,579.

The canal systems of the Dominion under Government control are the River St. Lawrence, the Welland, the Sault Ste. Marie, the Richelieu, the River Ottawa, the Rideau, the Trent and St. Peters at Cape Breton. The total expenditure for original building and enlargement up to the end of the fiscal year 1897 was $69,289,531. A further expenditure of $14,500,345 was made for repairs, maintenance and operation, bringing the total up to $83,789,876. The revenue derived, including tolls and rents of lands and water powers, amounted to $11,302,577. During the fiscal year $2,348,637 was spent on new work and enlargement and $633,276 for repairs, renewals and operation, making a total for the year of $2,981,913. The revenue for the same period was $384,781.

During the navigation season of 1896 on the Welland Canal 1,279,987 tons of freight were moved, an increase of 486,625 tons over the preceding year. Of this Canadian vessels carried 341,130 tons of through freight and United States vessels 902,465 tons. The total freight passing eastward and westward through this canal and to and from United States ports was 653,213 tons, an increase of 183,434 tons over the preceding year. On the Sault Ste. Marie Canal the total movement of freight was 4,577,399 tons. The canal on the American side carried 12,679,024, making an aggregate through the two canals of 17,256,423 tons. The tonnage of vessels passing through these canals is nearly double that passing through the Suez Canal, although the ocean connecting highway is open 365 days in the year.

A Seven-Arm Bracket Post.

The Union Switch & Signal Co. has lately put up at Woodsville, N. H., a bracket signal-post carrying three posts and seven arms, as shown in the accompanying engraving. This signal is a part of a plant, worked by a 32-lever machine, near the entrance to the freight yard of the Boston & Maine at the place



named. The signals here shown are for the tracks approaching from the south and leading toward the main line northward and to the White Mountain transfer, which diverges to the right near the overhead bridge shown in the engraving.

The main post of this signal is 35 ft. long and 25 ft. above ground, being 16 in. square at the base. The transverse timber, supporting the signals proper, is 17 ft. long and the lengths of the signal post are respectively 22 ft. 6 in., 15 ft. 6 in. and 15 ft. 6 in.

TECHNICAL.

Manufacturing and Business.

The Standard Supply & Equipment Co., 22 South Fifteenth street, Philadelphia, offer for sale three Pennsylvania Railroad, Class D, freight locomotives, with 18x22 in. cylinders, weight of engine being 84,300 lbs., and weight of tender 54,100 lbs. The locomotives are in use, and are offered for sale on account of being too light for the service required.

Contracts were awarded April 1, at Chicago, by City Electrician Ellicott, for extending the street lighting plant, bids for which were opened some time ago, as noted in this column. The contract for ten 150-light dynamos was let to the Western Electric Co. at $20,500, and contract for two engines to the Charles F. Elms Engineering Co., at $12,075. One engine and five dynamos will be placed in the old plant at Rice street and Lincoln avenue. The other engine and dynamos will be installed at the Twenty-second or Sixty-eighth street pumping stations on the South Side. These contracts will add 1,700 new arc lights, which, with the 1,547 already in use, will give the city 3,247 lamps.

The McCord journal box and lid, made by McCord & Co., Chicago, are specified for 400 coal cars ordered by the Toledo & Ohio Central from the Wells-French Co., and for 300 flat cars which the Northern Pacific is building at its own shops.

The firm of Vieillard & Osswall of Brooklyn, N. Y., has been incorporated, with a capital of $50,000, to manufacture machinery. The Directors are: C. E. Vieillard, Woodhaven, N. Y.; Col. Osswall, Brooklyn, N. Y., and T. B. Inness, New York City.

Among the foreign orders recently received by the Walker Co. are 20 double No. 3-S street car equipments, 3 single No. 3-S equipments and 18 double No. 3-N equipments for Paris, besides four 150 KW belted generators with two generator panels. Messrs. Bagnall & Hilles of Yokohama have ordered two 25 KW direct connected generators for Singapore. Recent domestic orders include two 150 KW 3-phase synchronous motors for the Lachine Rapids Power Co., a 700 KW alternator, single phase, for the Buffalo and Niagara Falls Electric Light & Power Co., two 400 KW belt-driven generators for the Syracuse Construction Co., and one 120 KW belted generator for the Northern Electric Co. of Baltimore.

The company has also recently taken a contract from the Government to build three disappearing gun carriages for 8-in. rifles, to be of the Crozier type, '96 model.

The Detroit Graphite Mfg. Co. report that their business is growing rapidly, and that they expect to do more than double the amount of business in the first three months of '98 than they did in 1897, and although the capacity of their factory has been doubled during the past year, they have been compelled to work nights to keep up with orders. They also state that the work they are doing for the Government has not only added to their sales, but has given them prestige.

The Central Trust Co. of New York has begun suit at Duluth, Minn., against the stockholders of the West Superior Iron & Steel Co. to recover deficiency judgment of $1,766,653, and to establish statutory liability. The property of the company was sold under mortgage foreclosure on Feb. 7 for $60,000. The bonded indebtedness was $1,826,653.

The Harriman Rolling Mill Co. of Harriman, Tenn., has received an order from the Government for 20 tons of iron, which has been sent to the Mare Island Navy Yard, San Francisco.

Press dispatches state that it is announced that the Johnson Company of Lorain, O., will be reorganized under the name of the Lorain Steel Co., with a capital of $14,000,000.

The "Diamond S" brake shoe, made by the Sargent Company, Chicago, has been adopted during the past week by four large railroads aggregating about 8,000 miles. The steel casting department of this firm during the month of March showed an increase in business of 75 per cent. over the corresponding time of last year.

Simplex body and truck bolsters, made by the Simplex Railway Appliance Co., Chicago, are specified on 400 cars ordered by the Toledo & Ohio Central from the Wells-French Co.

Iron and Steel.

The employees of the crucible department of the Aliquippa Steel Co., Aliquippa, Pa., have been given a 10 per cent. advance in wages.

The Cambria Iron Co. has declared a quarterly dividend of 2 per cent., payable April 1.

The government has placed an order with the National Tube Works Co., of McKeesport, Pa., for a large number of shell projectiles, which are being turned out at the plant of the United States Seamless Tube Co., of Christy Park, near McKeesport, owned by the National company.

The Sessions Foundry Co., Bristol, Conn., has recently received an order for about 260 tons of castings for delivery at St. Paul, Minn., for a counterweight street railway system for operating cars over heavy grades.

The Brown Hoisting & Conveying Machine Co., Cleveland, O., shipped last week a train of 17 cars of machinery for a large steel works at Mariopol, Russia. The shipment consisted of three Brown patent bridge tramways, driven by electricity, for handling ore. They also made a smaller shipment to Trieste, Austria, for the Krainische Industrie Gesellschaft.

New Stations and Shops.

Contract for the new shops of the Chicago Great Western at Oelwein, Ia., mentioned in this column March 25, has been let by the architects, Messrs. Reed & Stem, to Hoff Bros., contractors, of Chicago and Minneapolis. The shops will consist of ten buildings, with area of 180,000 sq. ft. The total cost of the plant will be $250,000, the contract with Hoff Bros. being for about $150,000, and including the water and sewer systems, consisting of a mile of sewer and almost a mile of water pipe. Contracts for plumbing, heating and power plant have not yet been closed.

The Kansas City, Fort Scott & Memphis does not contemplate building new shops at Rosedale.

The Illinois Central and the Wabash are discussing the question of building a new union passenger station at Decatur, and they expect to put up a new building during the coming summer. No definite plans have been agreed upon.

It has been reported that the Chicago, Rock Island & Pacific intends to move its shops from Caldwell to Wichita. There is no truth in this report.

Recent dispatches state that the Lehigh Valley will make extensive improvements to its property at Packerton. The company is at present building a freight transfer platform and shed at that point, and we are officially informed that no other improvements are to be made.

The Canada Atlantic has leased from the Chicago Dock & Canal Co. for a term of years dock space, and a large warehouse will be built thereon. The Chicago Dock & Canal Co. will put up the buildings and turn them over to the railroad when completed.

Dispatches from Springfield, Ill., announce that the Illinois Railroad and Warehouse Commission has accepted the plans and specifications for a new station to be erected in that city at Tenth and Washington streets by the Wabash Railroad, at a cost of $75,000.

Electricity on London Underground Railroads.

With reference to the proposal to substitute electricity for steam on the Metropolitan underground of London, the application which has been lodged by the Metropolitan Company for a bill granting permission to effect this improvement is opposed by the Great Western Railway Company. The reason for this step is that the company when it has equipped its lines electrically will be able to say to the Great Western, which runs seventeen trains a day over the Metropolitan rails, "We are an electric railroad, you are a steam railroad. We no longer approve of your rolling stock, but require you to substitute electric motors." This is the complaint set up by the opposers. The Metropolitan Company only proposes to equip certain lines, and not all, for electrical working, with a view to better ventilation. The system to be adopted has not been decided upon, the company asking for three years in which to make further investigations.

The new electric railroad which is to be built under London from the city to Brixton will have stations at Brixton Hill, Lorne Road, Kennington Oval, Kennington Cross, Lambeth, St. George's Circus and King William Street, City. The City & South London Electric Railway Company has agreed to work the line in perpetuity. The tunneling operations will be carried on by the Greathead shield system. The City & South London Railway Company is understood to be now building a new tunnel under the River Thames for the purpose of extension northward to Islington.

The Proposed Reservoir on the Nile at Assuam.

Press reports state that the great Nile reservoir at Assuam is to be made. Mr. John Aud has undertaken to do the work under the superintendence of Sir Benjamin Baker. The work is to be completed in five years, the contractors to accept payment by annual installments of 160,000 pounds sterling, extending over 30 years, beginning from the completion of the dam.

The dam is to be built upon the rocks which form the First Cataract of the Nile, and is to consist of an ashlar wall of granite with spill-ways. The minimum height of the comb from the riverbed is to be 76 ft. When the dam is completed the head and fall of the water will be 46 ft. The dam will be about 6,000 ft. long. The water thus stored will amount to about 37,605 million cubic feet. Locks will be constructed to permit the passage of steamers.

The estimated direct ultimate annual return to the state is three-quarters of a million of pounds sterling, while it is calculated that the increased annual value of the crops will represent ten times that sum. In the small province of Gisseh alone the area under summer crops would be increased from 5,000 to 60,000 acres. As the average value of the summer crop is no less than 10 pounds sterling per acre, there would be a net increase of over half a million sterling in that little district alone.

A second dam is to be built at Assuit for the purpose of raising the river level during the summer, thus increasing the distributing power of the canals in Middle Egypt and the Fayum, and it is designed much upon the lines of the great barrage north of Cairo.

Electricity on the "Alley" Elevated.

The South Side Elevated R. R., Chicago, has announced its intention to commence operating trains by electricity, Friday, April 15, the boilers, engines and generators being in place. Thirty cars have been fitted with motors and delivered to the road. The motor cars will be put in service a few at a time, and the change from steam to electricity will be made gradually.

Trolley in the Downtown District, Chicago.

On the pretext of requiring additional facilities for bringing the Wentworth avenue trolley cars downtown while the work of elevating and depressing the railroad tracks at the Sixteenth street crossing is in progress, the Chicago City Railway recently obtained permission from the Chicago City Council to erect a temporary trolley line in the downtown district. The agreement provides for running these cars over the present tracks in Twenty-second street to State street and Wabash avenue, a trolley line being built in both these streets as far north as Van Buren. The electric cars going north on State street are to run east on Van Buren to Wabash, and thence north, under the Union Loop structure, to Randolph street, where the trolley is to be carried on poles around the loop, in Madison street, Michigan avenue and Randolph street, now used by the cable cars. Since permission was granted, the City Railway has been working night and day to complete the work in the downtown district, which, however, has now been stopped on Michigan avenue by an injunction based on a Supreme Court decision, of November 8 last, declaring that Michigan avenue and the Lake Front Park are for park purposes and only held in trust by the city; also, that adjoining property owners have the right to enjoin threatened encroachments. While the agreement is that the electric cars can follow the route above outlined only as long as the Sixteenth street crossing is obstructed, it is thought in Chicago that this is the first step in a scheme to replace the downtown cables by the overhead trolley.

Model of Richmond Compound for Purdue University.

The Richmond Locomotive Works has presented Purdue University with the full-sized model of the front end of a two-cylinder Richmond compound, which was exhibited at the last meeting of the Master Mechanics' Association at Old Point Comfort. This exhibit was described and illustrated in our issue of June 18 last, and consists of the original cylinders of the famous "tramp compound" No. 2427, fitted with a section of a front end, so that the receiver and draft appliances can be seen. The low-pressure cylinder was re-bored to show the quality of the casting, and the saddle cut away to show the intercepting valve. The "tramp compound" was built in September, 1894, and was run for short periods on many roads, the first cylinders, 19 in. and 30 in. by 24 in., being replaced in September, 1896, by new cylinders which were 20 in. and 32 in. in diameter by 36-in. stroke. The movements and performance of this engine have been given in the Railroad Gazette from time to time.

The Nelson Fender Ordinance, Chicago.

Corporation Counsel Thornton of Chicago rendered an opinion March 28 to the effect that the street car fender ordinance passed last September and noted in our issue of Oct. 22, 1897, page 752, could not be enforced, and that under its terms his department could not proceed to prosecute the companies which have ignored it. Mr. Thornton holds that there is nothing in the ordinance to prevent a jury from holding that the wheel guards at present used come within the provisions of the ordinance. Mayor Harrison at once instructed the law department to prepare a proper ordinance specifying basket fenders, which the City Council will be asked to pass as soon as it can be prepared.

Locomotive Staybolts.

Since the practice of providing test holes in the outer ends of locomotive staybolts has become general, several methods have been adopted for making these holes. The first and most common method is to drill the holes after the staybolts are in place in the firebox and headed over, and for this work light rotary drills driven by compressed air have been largely used. As this, however, is a slow process, many staybolts are now being provided with end holes at the time the bolts are made, in some cases the holes being punched and in others drilled by means of special machines. Thus the Chicago, Burlington & Quincy and Baldwin Locomotive Works punch these holes, while in the Union Pacific shops they are drilled. When punches are used, the staybolts are worked hot.

Sanitary District Bridge, Chicago.

The Sanitary District Trustees, Chicago, have secured options on the designs for eight-track, movable bridges, made by the Scherzer Rolling Lift Bridge Company and C. L. Strobel, for carrying over the canal the tracks of the Pittsburgh, Cincinnati, Chicago & St. Louis, Chicago & Northern Pacific and Union Stock Yards & Transit Company, in Campbell Avenue. The District is to pay $3,000 for the Strobel option, and $15,000 additional if that bridge is finally accepted; for the Scherzer option $8,000 is to be paid, with an additional $27,000 in the event the Scherzer bridge is built. The Sanitary District will at once ask for bids on both of these designs, and at the same time competitive designs may be submitted, provided the approval of the three railroads is first obtained. This arrangement, therefore, leaves out of consideration the eight-track swing bridge designed by the Sanitary District engineers and the design submitted by the Edge Moor Bridge Works; the former was considered unsuitable by the railroads.

The Scherzer Rolling Lift Bridge Company will be required to submit plans for a bridge having a clear opening of 120 ft., or 160 ft. center to center of bearings, the former estimates being based on a clear opening of 150 ft., or a span of 200 ft. This company convinced the Trustees that it was placed in an unfair position in previously being obliged to provide for a greater clear opening than any of its competitors. On account of making new plans and again securing bids, it will be several months before the final selection of a bridge for this site can be made.

Electric Roads for Manchester, England.

The Manchester Corporation has recently decided to buy the city tramways and work them by electricity on the trolley system, and it already possesses one of the most successful electric lighting systems in England.

Oil on the Ballast.

The Long Island Railroad Company have entered into a contract with the Dustless Roadbed Company whereby they have taken a license to use the Nichol system of sprinkling their roadbed with oil for laying dust. They have an oil car under construction and will begin sprinkling during May.

The West Jersey & Seashore Railroad Company has begun to sprinkle the Camden & Atlantic Division from Camden to Atlantic City. This road has recently been retracked and laid with 100-lb. rails. Their experience last summer with the use of oil for laying dust was such that the whole system will be oiled from one end to the other.

The Nicaragua Canal Commission.

The commission to investigate and report on the Nicaragua Canal route and project reached New York on the 30th, having sailed from that port for Nicaragua Dec. 5. It is expected that a preliminary report will be made soon, but the final report will not be submitted until next June. The commissioners do not make public their estimate of the cost, which, very likely, they have not decided upon themselves. It will be remembered that this commission is composed of Rear Admiral John G. Walker, U. S. N., Col. Peter C. Haines, Corps of Engineers, U. S. A., and Mr. Lewis M. Haupt, Civil Engineer of Philadelphia.

The surveys are still going on in the field. According to press dispatches the hydrographic party, under Lieut. G. C. Hanus, U. S. N., and the transit party working in conjunction with them, in charge of Francis Lee Stuart, have reached the Toro Rapids, and the survey of the canal route will soon have been completed from twenty miles west of San Carlos to a point half way down the San Juan River from San Carlos to Ochoa. The boring party at the Ochoa dam site has found rock at a depth of 20 ft. below sea level. It is further said that Mr. E. S. Wheeler, Chief Engineer of the Commission, proposes to build the dam higher than any possible level and throw the water westward over a weir on the Pacific side whenever there is a surplus.

Air Brakes.

During the month of March, 1898, the Westinghouse Air Brake Co. manufactured, sold and shipped from its works at Wilmerding, Pa., 16,628 sets of air brakes for freight cars.

THE SCRAP HEAP.

Notes.

The New York Legislature has made an appropriation for carrying out the grade crossing law of 1897, but it is only $100,000, not $250,000, as recommended by the Railroad Commissioners.

At Raleigh, N. C., March 30 the Superior Court of the State delivered an opinion holding the Seaboard Air line and the Southern Railway guilty on charges of illegally issuing free passes to certain members of the Legislature last year. The railroads appealed to the Supreme Court.

It is reported that the speed contest between the Union Pacific and the Rock Island roads over the lines from Kansas City to Denver has been discontinued. The winner is supposed to be the one which secures the best mail contract from the Government, but it is not announced which one this will be. The best time reported was by the Rock Island train on March 27, 14 hours 10 minutes.

Since the electric (surface) street cars of Brooklyn have extended their runs over the bridge to New York, the passenger traffic on the regular bridge cars has fallen off to such an extent that a large proportion of the conductors, platform men and other employees of the bridge have been discharged. About 70 men altogether have been dismissed, and the number of cars in service has been reduced from 64 to 56. The cable is run only from 6 a. m. to 8 p. m., electric power being used during the night.

The Sault Ste. Marie Canal.

Assistant United States Engineer Joseph Ripley has been appointed General Superintendent of St. Mary's Falls ship canal at Sault Ste. Marie, Mich., to succeed Mr. E. S. Wheeler, Engineer on the Nicaragua Canal Commission. Mr. Ripley has been in the employ of the Government at the "Soo" since 1877, when he was appointed Inspector of Masonry on the Weitzel lock, which position he held until that work was completed in 1881. He has been in active charge of the channel improvements on St. Mary's River.

Traingrams.

According to a Texas paper this is the name applied on the Gulf, Colorado & Santa Fe, and the Missouri, Kansas & Texas, to R. R. B. letters which are delivered and attended to immediately on their arrival at destination. Instructions have been issued that communications which will bear delay of sending by train, but which might possibly suffer if they were to take the usual course of letters, shall be sent under this special delivery regulation. This relieves the telegraph wires, and, according to the reporter, the scheme has proved highly satisfactory.

A New Kind of Railroad Accident.

A recent Boston paper reports the decision of the Massachusetts Supreme Court in the peculiar case of William Thompson vs. the Lowell, Lawrence & Haverhill Street Railway, holding that the defendant must pay the plaintiff the $5,045 which he recovered in the Superior Court. The suit was brought for damages for the loss of an eye consequent upon negligent marksmanship by a "man born without hands" in a grove owned by the defendant. The plaintiff was a spectator at the exhibition, having been brought there on one of the defendant's cars, induced by an advertisement on its cars. The exhibition was given by a manager who was under contract with the defendant. A piece of bullet fired by the marksman entered the plaintiff's eye. The court held that the case was properly submitted to the jury, and that it could not be held that the plaintiff assumed the risk of such an accident.

Height of Buildings in Chicago.

At a special meeting of the Chicago City Council on March 23 the new building ordinance was passed. This ordinance was prepared by a building commission appointed by Mayor Harrison some months ago, and representing the Council, real estate, building, trades union and insurance interests. The new measure includes many provisions of the old ordinance. The most important new provision is that limiting buildings in the business district to 130 ft., or 10 stories in height, this provision being carried by an overwhelming majority of votes of the Council, in spite of considerable opposition. Another provision is that, if owners so desire, shutters made of "wire glass or electro-plate prisms not exceeding 4 in. square" may be substituted for iron shutters. It was explained that the insurance companies wanted this change, and that it was also recommended by the Chief of the Fire Department. It was stated that the insurance companies had found that the glass resisted fire and water as well as iron, while the Fire Department prefers it because it enables a watchman to see a fire, and it can be broken in by firemen when necessary. The ordinance makes architects responsible for buildings, and they must show their specifications before a permit will be issued, and must have a state license or their plans will not be considered. Contractors are to pay $2 a year license fee. The precautions against fire include standpipes and metal fire-escapes on all buildings four or more stories high, and fireproof walls between elevator shafts and stairways must be provided. A Building Department is established, with a Commissioner at $5,000 a year salary; a Deputy Commissioner at $4,000 a year, and a force of inspectors. March 26 was the last date on which permits under the old ordinance were issued, and two permits for 12-story buildings were taken out on that day.

Clontarf (Ireland) Electric Railroad.

The Clontarf section of the Dublin electric tramways has just been completed and opened. The overhead trolley is employed, and the total length is three miles of double track. This is the latest section of the Dublin Tramway Company's lines to be electrically equipped. It extends from the city boundary, Annesley Bridge, to Dollymount, and serves a suburban district studded with residential villas of a superior class. The gage is 5 ft. 3 in. The power house is situated at the Dollymount end of the line. There are three Babcock & Wilcox boilers, three McIntosh & Seymour horizontal tandem compound engines (cylinders 23 in. x 11½ in. x 17 in. stroke), direct coupled to six pole 150 kilowatt, 500 volt, 200 revolutions per minute Thomson-Houston generators. The overhead line construction is on the span wire system throughout. The rails are 7-in. girder, bonded with Chicago 4-0 and 30-in. bonds. There are 25 motor cars. The line is to be extended to Howth, a seaside resort six miles distant. The line was opened the middle of March.

New Railroad Commissioners.

Senator D. J. Palmer of Washington, Ia., has been named by Governor Shaw a member of the Board of Railroad Commissions of Iowa to fill the vacancy caused by the death of Commissioner Charles Davidson.

William Campbell of Antrim, Kan., has been reappointed a member of the Kansas State Board of Railroad Commissioners for a term of three years from April 1.

No Injunction for the Lone Star Steamship Line.

At New Orleans on March 29 Judges Pardee, McCormack and Swain, in the United States Circuit Court of Appeals, decided the "Lone Star" steamship case. The latter line sought to prevent the Texas roads from making for the Mallory Line more favorable divisions and facilities on through freight than they would grant the plaintiff, virtually instituting a boycott. The court refused to maintain the temporary injunction that had been granted. It held that the contract of the railroad and the Mallory Line was legal; that the Texas Commission could not interfere with interstate commerce; that Congress had not granted the Interstate Commerce Commission the right to interfere with such contracts, and that the Circuit Courts could not grant such injunctions in advance of the necessary legislation; hence the decision of the Texas Circuit Court granting the injunction was reversed and the case remanded.

Disastrous Flood at Shawneetown.

The village of Shawneetown, Ill., on the Ohio River, about 75 miles northeast of Cairo, was inundated by a flood on Sunday afternoon April 3, and about 30 persons were drowned. The levee, built several years ago by the Government to protect the

town from the Ohio River in time of flood, gave way about one mile above the town, and the break widened so rapidly that the lower part of the town was overwhelmed before people had time to escape. The greater part of the village is 15 ft. below the top of the levee, and the whole population, about 2,000 persons, had to flee for their lives, saving nothing. Many buildings were destroyed. Shawneetown is reached by branches of the Louisville & Nashville and the Baltimore & Ohio Southwestern.

Car Curtains.

We have recently spoken of the substitution of curtains in place of slat blinds for the windows of closed trolley cars and the extensive use of leather fabrics in place of canvas for curtains for both steam and street railroads. Some five years ago the E. T. Burrowes Co. of Portland, Me., put on the market a waterproof curtain material known as Oakette, and the company reports a steady increase in the sales of this material for steam and street railroads and steamboats. A single thickness of heavy material is used with the waterproof substance applied to it directly, permeating the texture. It is printed in colors and patterns suitable for particular requirements. It is claimed for Oakette that it cannot be scratched or marred with the finger nail, the surface being hard; is non-absorbent, water, dust, grease and stain proof, may be washed with water and sponge and is not affected by heat or cold.

The American Train Dispatcher.

Mr. W. S. Glover, Chief Train Dispatcher of the Chicago, Burlington & Quincy, speaking at the March meeting of the St. Louis Railway Club, gave some scraps of the early history of train dispatching in this country, from which we quote: The first railroad telegraph line was erected in 1847-8 on the Erie Railroad, under the supervision of Ezra Cornell, the founder of Cornell University, Chas. Minot, then general superintendent of the Erie road, being convinced of the value of the telegraph, persuaded his directors to authorize its adoption. In 1851, after the matter had been discussed by the stockholders, officials and employees for four years, the latter were most emphatic in denouncing the undertaking and were unanimous in refusing to obey orders making meeting points between trains by wire, but instructions were issued, and train men were forced into compliance. The Delaware, Lackawanna & Western was the second road to use the telegraph for moving trains. Jan. 1, 1857, Mr. D. H. Conklin, now Mayor of Decatur, Ill., was appointed superintendent of telegraph and train dispatchers of that road, he being one of the first dispatchers in the East. Soon inquiries began to come in from other roads as to rules, copies of blanks, etc., and the system became general. Previous to its adoption on the Delaware, Lackawanna & Western, trainmen were from four to five days making trips that soon after were made in less than 24 hours.

In the West the Chicago, Burlington & Quincy was the first road to move trains by telegraph, in the early part of 1863. Mr. C. H. Chappell, now general manager of the Chicago & Alton, was the train dispatcher, and Mr. F. C. Rice, now superintendent of the Illinois lines of the Chicago, Burlington & Quincy, the operator. Mr. Chappell had been sent to the Erie road to learn the rules and methods. . . . Mr. Robert Pitcairn, now superintendent and general agent of the Pennsylvania at Pittsburgh, is among the early dispatchers, having moved trains by wire in 1855 and 1856. He was the first person to introduce the duplicate order system in Pennsylvania and Virginia, in the early '60s. He had charge of the movement of Government troops and munitions of war.

From the crude, unsatisfactory manner of thirty to forty years ago, with a large per cent. of train accidents chargeable to the dispatcher, train dispatching has improved until to-day the per cent. of accidents chargeable to the train dispatcher is brought down to a minimum. With the old telegraph register used in receiving it took thirty minutes or more to make meeting points by wire. The train orders were written upon any kind of paper and rewritten several times, being sent to one office at a time. Each would in most cases get a different wording, and frequent were the collisions from a lap order. During the prevalence of the single order, the dispatcher spent about one-third of his time checking up his orders to see if he were going to have a collision and at about what point on the line it would occur. But to-day dispatching stands in the front ranks, made so by the American Railway Association, on whose Train Rule Committee are superintendents and managers who have spent years at the dispatcher's table. The result of their deliberations is the Standard Code, making the labor of the dispatcher less and his work more accurate and perfect, and taking away that terrible strain on his mind that prevailed under the old single order system.

The following officers were chosen at a meeting of the directors of this company, which is an allied company of the Nicaragua Canal Company, held in New York City, March 23: President, Jacob W. Muller; Chairman of the Board, Henry R. Hoyt; Vice-President, Gordon Macdonald; Second Vice-President, William F. Cochran; Treasurer, R. L. Edwards; Secretary, Edwin R. Lancaster. (Mar. 18, p. 204.)

Electricity on the Manhattan Elevated.

A correspondent writes that he should not think it would be a very costly undertaking to operate the lines of the Manhattan Elevated Railroad by electricity, as the road already has a large Battery at one terminal.

Cab Service of the Pennsylvania Railroad.

Mr. J. R. Wood, General Passenger Agent of the Pennsylvania Railroad, in a letter to the St. Louis Railway Club, described the cab service furnished by the Pennsylvania at Philadelphia and New York.

About 12 years ago the Pennsylvania Railroad organized a cab service at Broad street station, Philadelphia, consisting of 25 four-wheelers and 25 hansom cabs. Sixty thousand dollars was set aside for this purpose by the Company, and the service has been so successful as to enable the Company to build new cabs as required from time to time, cover all repairs and expenses, and show a fair profit at the end of each year.

A similar cab service was established at the new 23d street station, New York, last year, more elaborate carriages being used, which consists of 58 vehicles, comprising 20 hansoms, 20 four-wheelers, 10 victorias, four single omnibuses seating four people, and four double omnibuses, seating six or eight. The earnings from the New York cab service have not yet proved sufficient to cover the expenses, but the service is growing in popularity, and will likely within another year become self-sustaining.

The rates of fare charged both in New York and Philadelphia are the same as are now and have been in use for many years in London and other cities of England; but in the matter of earnings the English cabman, in being permitted to solicit passengers in the public streets, has a manifest advantage over these drivers, who are required to carry passengers from and to the station only, and nearly always go one way empty. The drivers hire their cabs from the Company at a stated rate per day which also includes the use of two horses. Cabs to ply to and from the stations of the Pennsylvania are furnished upon telephone call, in both cities, and in that way are becoming competitors with the public cabs.

Railroad Concessions in Venezuela.

The Venezuelan Government has made a contract with Messrs G. Custodio Milano, Emilio Antonio Santodomingo, Ramon Contasti Laveaux and Francisco E. Rivero Saldivia to build a railroad from the port of Perico crossing the rivers Atures and Maypures to the port of Crucero, both points being on the right bank of the Orinoco River in the Federal Amazon territory. The syndicate has the right to use either steam or electric power, and the track is to be 2 ft. 5 in. in width, with a minimum radius of curves of 30 meters (99 ft. 3 in.) and with grade not to exceed 3 per cent. Building is to begin within one year and to be completed within three years from the date of the contract (Feb. 5, 1898). The Government gives a subsidy of 20,000 bolivars for each kilometer (about $6,200 per mile) to be paid in installments corresponding to each section of 10 km. completed. Among the privileges and exemptions given to the company are the right of free entry of all materials used in building and equipping the line, the right of taking from the national forests without cost the wood and materials necessary for building, the exemption from all national taxes or contributions with the exception of the stamp act, and the right of acquiring mines and quarries along the line. The company also receives land on either side in alternating sections of 1,000 meters (3,280 ft.) front by 500 meters in depth. Fares and freights are to be decided upon by the Government, but the company is to carry free of charge all mails and to convey at half rates troops, public employees and Government merchandise. The deposit of 50,000 bolivars in gold ($9,650) is to be made by the company as a guaranty.

Another contract has been made by the Government with Francisco E. Rivero and Hermogenes Rivero Saldivia of Caracas to build a line of railroad from Los Teques through Facata to Cua, all in the Bolivar District of the state of Miranda. The terms of the contract, including subsidies, rights, privileges, exemptions, etc., are practically the same as under the other contract.

LOCOMOTIVE BUILDING.

The Schenectady Locomotive Works are building one engine for the New England Gas & Coke Co.

The Baldwin Locomotive Works have received an order to build two locomotives for the Argentine Government railroads.

The Kansas & Southeastern Railroad (see Railroad Construction column) is in the market for one 8-wheel passenger locomotive, to weigh 40 or 50 tons.

The Baldwin Locomotive Works are building one American type locomotive for P. G. Mendez & Co. of Mexico.

The Baldwin Locomotive Works have received an order to build five mogul engines for the Egyptian Government Railways. These are in addition to the 15 referred to in our issue of March 25.

The Ottawa, Arnprior & Parry Sound Railroad has placed an order with the Baldwin Locomotive Works for five compound consolidation freight engines, in addition to the order mentioned in our issue of March 18.

The Chihuahua & Pacific Railroad now being built, will shortly be in the market for a number of locomotives. Specifications have not yet been finished. A. H. Paget, 80 Broadway, New York City, is President.

The order for new engines for the Delaware & Hudson Canal Co., referred to in our issue of March 18, has been changed from two moguls to six consolidation engines. They will be built by the Dickson Locomotive Works.

The Interoceanic Railroad of Mexico will buy ten new locomotives. A report in a Mexican paper states that G. M. Stewart, General Manager of the road, will visit the United States this month for the purpose of placing the order.

The Baldwin Locomotive Works have received orders to build six consolidation engines for the Robla á Valmaseda Railroad of Spain and for 12 Vauclain compound six coupled tank locomotives, with pony trucks, for the Chinese Eastern Railroad (the Russian railroad across Manchuria).

The Lehigh Valley has ordered from the Baldwin Locomotive Works ten 10-wheel freight locomotives with 20x24 in. cylinders and 68 in. drivers, and to weigh about 136,000 lbs., and four Atlantic type passenger locomotives with 19x26 in. cylinders; 76 in. drivers, and to weigh about 142,000 lbs. All the engines will have Wooten boilers.

In our issue of March 25 we referred to an order of the Chicago, Indianapolis & Louisville with the Brooks Locomotive Works for five consolidation freight engines. These will be 12-wheelers and weigh 176,000 lbs., with 144,000 lbs. on the drivers; cylinders, 21x26 in.; driving wheels, 54 in. diam.; boiler, improved Belpaire, with a working steam pressure of 200 lbs.; firebox, length 120 in., width 41¼ in.; tank capacity, 4,500 gals.; coal capacity, 9½ tons. The engines will be equipped with New York air brakes, Gollmar bell ringers, Monarch brakebeams, Ross-Meehan brake shoes, Trojan couplers, United States piston rod packings, Leach sanding devices, Detroit lubricators and French springs.

The Brooks Locomotive Works are building one 10-wheel freight engine for the St. Louis, Indianapolis & Eastern. It will weight 115,800 lbs., with 92,000 lbs. on the drivers; cylinders, 18x24 in.; driving wheels, 56 in. diam.; boiler, Belpaire, with a working steam pressure of 180 lbs.; firebox, length 96 in., width 33⅜ in.; tank capacity, 3,700 gals.; coal capacity, seven tons. The engine will be equipped with American outside equalizing driver and Westinghouse tender and train brakes, Cambria steel axles, National hollow brakebeams, Ross-Meehan brake shoes, Gould couplers, United States piston and valve rod packings, Crosby safety valves, Nathan lubricators, Scott springs, Crosby steam gages and Midvale tires.

The Richmond Locomotive Works have received an order from the St. Louis Southwestern for six 10-wheel locomotives for July delivery. The weight on drivers will be about 109,000 lbs., and the total weight about 140,000 lbs.; the cylinders will measure 20x26 in.; diameter of drivers, 61 in.; crown bar wagon top boilers, 180 lbs. working steam pressure; firebox, 8 ft. 9 in. long inside, 41¼ in. wide inside. The capacity of the tank for water is 4,000 gals., for coal eight tons. Westinghouse-American outside equalized air brakes, Gollmar bell ringers, Smith couplers, No. 10 Ohio injectors, United States Metallic piston rod and valve packing, Coale safety valves, No. 9 Nathan sight feed lubricators, A. French Spring Co.'s springs, and cast steel wheel centers, frames and driving boxes will be used.

CAR BUILDING.

The St. Charles Car Co. is building 21 cars for the Missouri Pacific for the Central Branch Union Pacific.

The Union Pacific has given an order to the Missouri Car & Foundry Co. for 1,500 box and 500 stock cars.

The Nashville, Chattanooga & St. Louis has placed an order with the Ohio Falls Car Mfg. Co. for three postal cars.

The Central Railroad of New Jersey is preparing specifications for 500 new coal cars. They may be built of steel.

The General Manager of the St. Joseph & Grand Island informs us that the road is not considering buying any new freight equipment at present.

The Kansas & Southeastern Railroad (see Railway Construction column) is in the market for one combination coach, fitted for passenger, mail and baggage.

The Chesapeake & Ohio has placed an order with Pullman's Palace Car Co. for the 750 hopper bottom gondola and 250 flat bottom gondola cars referred to in our last issue.

The Chihuahua & Pacific Railroad (see Locomotive Building column) will require some new freight and passenger equipment. The specifications have not yet been finished.

The Jackson & Sharp Co. has received an order to build 250 cars for the Argentine Government railroads, and it is understood that the order may be increased to 350 or 400.

In the annual report of the Mexican National Railroad Co. for the year ending December 31, 1897, it is stated that arrangements are being made to buy some additional equipment.

It is stated that the Interoceanic railroad, of Mexico, will buy 1,000 new freight cars, and that General Manager Stewart will visit the United States this month for the purpose of buying this equipment.

The Pennsylvania Railroad has let the contract for the 1,000 steel cars of 100,000 lbs. capacity, referred to in our last issue, to the Schoen Pressed Steel Co. It is possible that this order may be followed by one for an additional thousand.

The 85 coal cars which the Terre Haute Car Co. is building for the Terre Haute & Indianapolis Railroad will be 35 ft. long, of 80,000 lbs. capacity and have diamond trucks, Pennsylvania Railroad standard pressed steel bolsters, National Hollow brakebeams, Westinghouse quick-action brakes, Janney couplers and Graham draft rigging.

In our issue of March 25 we referred to an order for 400 cars with the Wells & French Co., for the Ohio Central lines. They will be gondolas of 60,000 lbs. capacity, for delivery in July and August, 36 ft. 10 in. long over framing; 9 ft. wide over side sills and 3 ft. 3½ in. high, inside, and will be equipped with Monarch solid brakebeams, Congdon brake shoes, Westinghouse air brakes, Fulton Iron & Engine Works' brasses, Tower couplers, American continuous draft rigging, McCord journal boxes and journal box lids and Simplex body and truck bolsters.

The Northern Pacific has decided to build the 300 flat cars mentioned in this column March 18, and a portion will be built at the company's shops at Tacoma, Wash., and the balance at the Brainard, Minn., shops. These cars will be 41 ft. long, 8 ft. 6 in. wide and 3 ft. 6½ in. high, and will weigh 25,000 lbs. and have a capacity of 70,000 lbs. They will have steel axles, American cast steel bolsters, Barber trucks, cast iron wheels, Westinghouse air brakes, McCord journal boxes and lids, Congdon brake shoes, M. C. B. brasses and Northern Pacific double spring draft rigging. One hundred cars will have Kewanee brake beams and 200 Northern Pacific beams.

G. W. Ettenger of London contemplates placing in the hands of a New York firm within the next few weeks an inquiry for electric cars. Plans have already been drawn, but are at present undergoing some changes.

BRIDGE BUILDING.

ALBANY, N. Y.—Senator Nussbaum's bill passed the Assembly to allow a bridge to be built across the Mohawk above the state dam, between two counties, without getting the consent of the supervisors of either county.

BLOOMINGTON, ILL.—The City Engineer has prepared plans for a viaduct to be built over the tracks of the Lake Erie & Western and the Cleveland, Cincinnati, Chicago & St. Louis.

BOSTON, MASS.—A bill has been reported in the Legislature by the Committee on Metropolitan Affairs to require the city of Boston to rebuild the Malden Bridge across the Mystic River 100 ft. wide of stone or iron.

BUFFALO, N. Y.—The House Committee on Interstate and Foreign Commerce agreed to report with a favorable recommendation Representative Alexander's bill giving the assent of Congress to the project of the company chartered by the state of New York to build the Grand Island bridge across the Niagara River to be used for railroad and general traffic purposes. Among those interested in this bridge are J. N. Adam, Charles D. Marshall, Bronson C. Rumsey, George Van Vleck, Albert J. Wheeler, Victor M. Boughton, Robert Fulton, John M. Drill.

CAMDEN, N. J.—The Bridge Committee of the Board of Freeholders, Dr. J. B. Davis, Chairman, will submit plans to the War Department in a short time for the proposed bridge across Cooper's Creek.

CHESTER, PA.—The Wilmington & Chester Electric Railroad Co. will build a bridge over the tracks of the Philadelphia, Wilmington & Baltimore at Claymont crossing.

CHICAGO, ILL.—The State street bridge was closed March 28 to street car and vehicle traffic and partially swung so that only pedestrians could cross it. On April 3 the bridge was entirely closed, and will so remain until a decision is reached as to the necessary repairs. Piles are being driven around the center pier by the city, and it is probable that in a few days pedestrians can again use the bridge which will be closed indefinitely to all other traffic.

Chicago Terminal Transfer will build a bridge. (See Railroad Construction column.)

EMPORIA, KAN.—Atchison, Topeka & Santa Fe will build bridges. (Railroad Construction column.)

LA FAYETTE, N. J.—It is reported that a bridge will be built over the Essex Canal at Pacific St. A. H. Konkle or the Citizens' Association can probably give information.

MOSGROVE, PA.—The Allegheny & Western, it is reported, will build a bridge over the Allegheny at Mosgrove to be about 1,220 ft. long.

MURPHYSBORO, ILL.—Illinois Central will build bridges. (Railroad Construction column.)

PHILADELPHIA, PA.—The contract for the substructure of the new Penrose Ferry Bridge was awarded to the Artificial Stone Pavement & Construction Co. at $41,000. The contract for the superstructure, which is estimated to cost about $50,000, has not yet been awarded.

SENECA FALLS, N. Y.—A bridge will be built over the Seneca River to cost about $15,000.

TRENTON, N. J.—A combination steel, brick arch and concrete bridge will be built over Golden Run Creek, Trenton Junction. George Q. Lowell, Chmn. Bd. Freeholders.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Berkshire.—Quarterly, 1½, payable April 1.
Boston & Providence.—Guaranteed quarterly, 2½ per cent., April 1.
Central of N. J.—Quarterly, 1 per cent., payable May 2.
Cincinnati, Sandusky & Cleveland.—Preferred, semi-annual, 3½ per cent., payable May 2.
Concord & Montreal.—Quarterly, 1¾ per cent., payable April 1.
Cumberland Valley.—Quarterly, 2 per cent., payable April 1.
Eel River.—1½ per cent., payable April 6.
European & North American.—2½ per cent., payable April 15.
Georgia Railroad & Banking.—Quarterly, 2¾ per cent., April 15.
Maine Central.—Quarterly, 1½ per cent., payable April 1.
New London Northern.—Quarterly, 2¼ per cent., payable April 3.
Norwich & Worcester.—Quarterly, 2 per cent., payable April 1.
Old Colony.—Quarterly, 1¾ per cent., payable April 1.
Pittsburgh, Ft. Wayne & Chicago.—Special guaranteed, quarterly, 1¾ per cent., payable April 1; regular guaranteed quarterly, 1¾ per cent., payable April 5.
Sioux City & Pacific.—Preferred, 3½ per cent., payable April 1.
Western Penn.—Three per cent., payable April 13.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

American Railway Association.—Galt House, Louisville, April 6.
American Society of Civil Engineers.—Meets at the house of the society, 220 West Fifty-seventh street, New York, on the first and third Wednesdays in each month at 8 p. m.
Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.
Boston Society of Civil Engineers.—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month at 7.30 p. m.
Canadian Society of Civil Engineers.—Meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.
Central Railway Club.—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.
Chicago Electrical Association.—Meets at Room 7,137, Monadnock Building, Chicago, on the first and third Fridays of each month at 8 p. m. J. R. Cravath, secretary.
Civil Engineers' Club of Cleveland.—Meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.
Civil Engineers' Society of St. Paul.—Meets on the first Monday of each month except June, July, August and September.
Denver Society of Civil Engineers.—Meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.
Engineers' Club of Cincinnati.—Meets at the rooms of the Literary Club, 25 East Eighth street, on the third Thursday of each month, excepting July and August, at 7.30 p. m.
Engineers' Club of Columbus (O.).—Meets at 12½ North High street on the first and third Saturdays from September to June.
Engineers' Club of Minneapolis.—Meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.
Engineers' Club of Philadelphia.—Meets at the house of the club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month at 8 p. m., except during July and August.
Engineers' Club of St. Louis.—Meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.
Engineers' Society of Western New York.—Holds regular meetings on the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.
Engineers' Society of Western Pennsylvania.—Meets at 410 Penn avenue, Pittsburg, Pa., on the third Tuesday in each month at 7.30 p. m.
Locomotive Foreman's Club.—Meets every second Tuesday in the clubroom of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.
Master Car Builders' Association.—Saratoga Springs, N. Y., Wednesday, June 15.
Master Mechanics' Association.—Saratoga Springs, N. Y., Monday, June 20.
Montana Society of Civil Engineers.—Meets at Helena, Mont., on the third Saturday in each month at 7.30 p. m.
New England Railroad Club.—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.
New York Railroad Club.—Meets at 12 West Thirty-first street, New York City, on the third Thursday in each month at 8 p. m.
Northwest Railway Club.—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.
Northwestern Track and Bridge Association.—Meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.
St. Louis Railway Club.—Holds its regular meeting on the second Friday of each month at 3 p. m.
Southern and Southwestern Railway Club.—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November.
Technical Society of the Pacific Coast.—Meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month at 8 p. m.
Western Foundrymen's Association.—Meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1,533 Marquette Building, Chicago, is secretary.
Western Railway Club.—Meets in Chicago on the third Tuesday of each month at 2 p. m.
Western Society of Engineers.—Meets in its rooms on the first Wednesday of each month at 8 p. m., to hear reports and for the reading and discussion of papers. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago.

Chicago Electrical Association.

A regular meeting of the Chicago Electrical Association was held Friday evening, April 1, at room 1737, Monadnock Block, Chicago. Mr. H. H. Cutler read a paper, "Motor Regulation and Protection," which was discussed by Mr. F. S. Hickok.

New England Railroad Club.

The next annual meeting of the Club will be held at Pierce Hall, Copley Square, Boston, Mass., Tuesday evening, April 12. A paper by P. M. Hammett, M. M., B. & M. R. R., on "Unnecessary Labor in Connection with Locomotive Details" will be read and discussed.

St. Louis Railway Club.

The next regular meeting of the St. Louis Railway Club will be held Friday, April 8, 1898, at 3 p. m., in the parlors of the Southern Hotel. A paper will be presented by C. W. Waughop, Joint Car Inspector, East St. Louis, Ill., entitled "Car Inspection—Past, Present and Future." In addition to the paper, the annual election of officers will take place.

Western Railway Club.

As announced in our issue of March 25, the next meeting of the Western Railway Club will be held at Purdue University. A special train over the Chicago, Indianapolis & Louisville has been arranged to leave the Polk Street Station, Chicago, Tuesday morning, April 19, just ahead of the regular 8.30 train, and returning it will leave La Fayette about 5 o'clock in the afternoon. The University authorities advise that the programme for the day will be so arranged that the members of the Club can see the scope and character of the work at Purdue to the best advantage. A paper on the air resistance of model trains will be presented by Prof. W. F. M. Goss, but the discussion will be postponed until the May meeting.

American Society of Irrigation Engineers.

The fifth annual meeting of the American Society of Irrigation Engineers was held at Denver, Col., on Friday and Saturday, March 25 and 26. Only a small number of members were in attendance, largely owing to the fact, as evidenced in letters received, that there is greater activity in engineering matters in the West than for some years previous. Officers for the ensuing year were elected as follows: President, Elwood Mead, State Engineer, Cheyenne, Wyoming; Vice-President, Walter H. Graves, Engineer of Irrigation, Crow Indian Reservation, Montana; Directors: William Pearce, Chief Inspector on Mines, Calgary, Canada; Robert B. Stanton, Coronado, Cal., and Chas. L. Stevenson, Salt Lake City, Utah; all past presidents being also directors ex-officio. Capt. John S. Titcomb, Denver, Col., was re-elected Secretary-Treasurer.

Texas Railway Club.

The next semi-annual meeting of the Texas Railway Club will be held at San Antonio April 18 and 19. In connection with the regular routine business of the Club, including the election of officers for the ensuing year, the following papers will be presented: "Economy in the Use of Fuel on Railways," by Mr. S. R. Tuggle, S. M. P. & M., H. & T. C. Railway; "System of Car Inspection," by Mr. J. W. Hogsett, Chief Joint Inspector, Fort Worth Railways; "The Necessity of Harmony in the Departments of Railway Service," by Mr. A. S. Grant, M. M., H. E. & W. T. Railway.

The following discussions will be had on papers which were presented at the last meeting: "Cast Steel in Locomotive Construction," by Edward F. Goltra, Vice-President and General Manager American Steel Foundry Co.; Mr. Thomas Gallagher, President Shickle, Harrison & Howard Steel Co.; Mr. E. W. Hayes, Superintendent M. P. & M., F. W. & D. C. Railway; Mr. G. H. Bryant, representing Thomas Prossor & Son. "Malleable Iron in Car Construction," Mr. E. S. Marshall, Manager Railway Department Missouri Malleable Iron Co.; Mr. W. E. Coffin, representing National Malleable Castings Co.; Mr. W. D. Minton, M. C. B., T. & P. Railway. "Heating of Car and Locomotive Journals," Mr. M. J. Hurley, Waters-Pierce Oil Co.; Mr. J. A. Roosevelt, Galena Oil Works, Limited; Mr. James McGee, M. C. B., H. & T. C. Railway; Mr. P. W. Farrell, G. F. C. D., G. C. & S. F. Railway. "Economy in Car Cleaning," Mr. John Doyle, M. C. B., M., K. & T. Railway of Texas; Mr. J. C. Ramsey, M. M., K. C., W. & G. Railway; Mr. Frank McGee, F. C. D., Ft. W. & D. C. Railway.

PERSONAL.

—Mr. Charles A. Van Keuren was appointed April 4, by the Jersey City Board of Street and Water Commissioners, Chief Engineer of the Engineering Bureau of Jersey City, succeeding the late L. D. Fowler.

—Mr. Percival Roberts, President of the A. & P. Roberts Co., proprietors of the Pencoyd Iron Works, died at his home in Philadelphia March 30. Mr. Roberts was born in Philadelphia May 2, 1830. He graduated from Rensselaer Polytechnic at Troy in 1847, taking the degree of civil engineer. He then spent several years as an engineer on the location of the Pittsburgh, Fort Wayne & Chicago Railroad, then building. In 1852 in connection with Algernon Roberts—a brother of the late George B. Roberts, President of the Pennsylvania Railroad—he established the Pencoyd Iron Works under the firm name of A. & P. Roberts & Co. The works were originally intended for the manufacture of anvils and heavy hardware. An axle forge was soon added, and about the year 1858 they added to the product of the works the building of iron bridges; being one of the first, if not the first, of such concerns in this country. They also at this time purchased of Squire Whipple of Albany his patents covering iron truss construction.

Mr. Roberts was also connected with a number of coal companies in the anthracite region of Pennsylvania. He was a member of the American Institute of Mining Engineers.

ELECTIONS AND APPOINTMENTS.

Alabama Great Southern.—J. C. Moore has been appointed Auditor of Disbursements with office at Washington, D. C., succeeding H. I. Bettis. The title of W. H. Halsey has been changed from Claim Agent to Freight Claim Agent with office at Washington, D. C.

Arkansas Southern.—The officers of this company are as follows: J. W. Brown, Camden, Ark., President; C. R. Neeley, St. Louis, Mo., Vice-President; F. J. McLain, Auditor, with office at Junction City, Ark.

Atchison, Topeka & Santa Fe.—James H. Hazard, General Freight Agent, and George Blair, Traveling Passenger Agent, both with headquarters in Cincinnati, O., have resigned, and the offices have been abolished.

Bradford, Bordell & Kinzue.—A. B. Campbell, heretofore Acting Treasurer and Auditor, has been appointed Treasurer and Auditor with office at Bradford, Pa.

Boston & Albany.—H. B. Tindall, Foreign Freight Agent, with office in Boston, has resigned and has been succeeded by Charles Firth, heretofore agent at Westfield, Mass. Mr. Tindall was also agent of the White Line Central Transit Co.

Canada Atlantic.—M. Donaldson, Superintendent, has been appointed General Superintendent. J. Ogilvie has been appointed Superintendent of Motive Power, and will have charge of maintenance of motive power, reporting to the General Superintendent. C. J. Smith, heretofore General Freight and Passenger Agent, has been appointed General Traffic Manager. J. E. Walsh has been appointed Assistant General Passenger Agent, and W. P. Hinton has been appointed General Assistant Freight Agent with offices at Ottawa, Ont.

Central Vermont.—F. S. Holbrook has been appointed General Agent of the Freight Department with office at 88 Wall St., New York City.

Chicago & Southeastern.—J. Van Pelt, Auditor and Assistant to General Manager H. Crawford, Jr., has resigned. He has been succeeded by Robert C. McCants. W. C. Halfman has been appointed Master Mechanic with office at Lebanon, Ind., succeeding J. W. Roberts.

Chicago Junction.—The officers of this company, referred to in the Railroad News column of this issue, are as follows: President, J. A. Spoor; Vice-President, James H. Ashby; Secretary, James Miles; Treasurer, L. J. Dudley; Auditor, C. C. Chace; Traffic Manager, S. S. Whitehead; General Superintendent, R. Fitzgerald; Chief Engineer, C. W. Hotchkiss; Purchasing Agent, F. T. Croxon; Car Accountant, F. B. Hill. The general office is in the Monadnock Building, Chicago, Ill.

Chicago, Milwaukee & St. Paul.—J. H. Foster, heretofore Superintendent of the Wisconsin Valley Division, with headquarters at Babcock, Wis., has been appointed Superintendent of the River Division. P. E. Eldredge has been appointed Super-

intendent of the Wisconsin Valley Division. R. M. Calkins, Division Freight and Passenger Agent of the Iowa & Dakota Division and Iowa & Minnesota Division, with headquarters at Mason City, Ia., has resigned. He is succeeded by W. S. Bratt, heretofore Commercial Agent at Grand Rapids, Mich. J. E. Williams succeeds Mr. Bratt.

Chicago, Rock Island & Pacific.—L. B. Gorham, heretofore Traveling Freight Agent at Salt Lake City, Utah, has been appointed to the newly created office of Commercial Agent at Portland, Ore. He is succeeded in Salt Lake City by J. L. Yundt of that city.

L. T. Canfield, Master Car Builder in charge of Chicago shops, has resigned. He has been succeeded by J. Van Dell. The resignation and appointment are effective April 1.

Columbus, Hocking Valley & Toledo.—John H. Winder of Atlanta, Ga., and formerly General Manager of the Sea Board Air Line, from which position he resigned in 1896, has been appointed Superintendent of the coal mines of the Columbus, Hocking Valley & Toledo.

Delaware, Lackawanna & Western.—The resignation of B. A. Hageman, Traffic Manager, with office in New York, which was tended about a year ago, has been accepted. Mr. Hageman resigns on account of continued ill health. He had been in the company's service since 1869. He also retires as a member of the Board of Managers of the Joint Traffic Association.

Detroit & Lima Northern.—W. S. Allen has been appointed Auditor, with headquarters at Tecumseh, Mich., succeeding A. L. Richmond, resigned.

Detroit, Toledo & Milwaukee.—J. R. Megrue, Vice-President and General Manager, has resigned and the office of General Manager has been abolished. N. K. Elliott, Superintendent, with office at Tecumseh, Mich., will have charge of the operation and maintenance of the property, succeeding Mr. Megrue. C. H. Roser, Assistant Treasurer and Purchasing Agent, with office at Tecumseh, has resigned, and C. M. Sturdevant of Sidney, O., has been appointed as his successor. C. A. Chambers, General Freight and Passenger Agent, F. C. Whipple, Assistant General Freight Agent; W. H. Weazell, Car Accountant; F. E. Franks, Assistant Freight and Ticket Agent, A. L. Richmond, Auditor, and J. W. Witmer, Master Mechanic, have also resigned.

Galveston, Houston & Henderson.—Harvey Webb Downey, General Freight and Passenger Agent, with headquarters at Galveston, Tex., has resigned. He has been succeeded by W. F. McClure, heretofore Acting General Freight and Passenger Agent.

Great Northern.—Louis W. Hill, son of President J. J. Hill, has been appointed Assistant to the President, succeeding F. E. Ward, promoted.

Gulf, Beaumont & Great Northern.—The directors of this company, the proposed successor to the Gulf, Beaumont & Kansas City, referred to in the Construction column, are as follows: N. D. Silsbee, Boston, Mass.; James Irvine, New York; John H. Kirby, Houston, Tex.; E. I. Kellie, Jasper; W. A. Fletcher, William Wiess, W. S. Davidson, Mark Wiess, W. C. Averill and Frank M. Aldridge, Beaumont, Tex. The directors have elected the following officers: John H. Kirby, President; W. S. Davidson, First Vice-President; W. W. Willson, Second Vice-President; W. W. Helbig, Secretary, and W. C. Averill, Treasurer.

Hazelhurst & Southeastern.—L. H. Wheeler was recently elected Secretary, with office at Hazelhurst, Wis., succeeding A. J. Ames, resigned.

Illinois Central.—A. Philbreck, heretofore Roadmaster at Memphis, Tenn., has been appointed Superintendent of the Memphis Division with headquarters at that place, succeeding J. B. Kemp, transferred. (April 1, p. 244.)

International & Great Northern.—Tae office of General Claim Agent has been abolished, H. B. Kane having resigned. Frank J. Matthews has been appointed to the new office of Stock Claim Agent with headquarters at Palestine, Tex.

Kansas & Southeastern.—The officers of this company, referred to in the Construction column, are: President and Treasurer, Francis S. Eaton; Secretary, A. N. Brown; Chief Engineer, Charles F. Leech, all of Kansas City, Kan. The New York representative is Dwight Braman, 7 Nassau street. (April 1, p. 245.)

Knoxville & Bristol.—The officials of this company, successor to the Morristown & Cumberland Gap, referred to in the Railroad News column, are as follows: President, Adolph Segal, Philadelphia, Pa.; General Counsel, Thomas B. Harned, Philadelphia; General Manager, H. M. Aiken, Morristown, Tenn.; Auditor and Treasurer, E. H. Pouder, Morristown. The general offices of the company are at Morristown, Tenn.

Lake Shore & Michigan Southern.—J. E. Slater, heretofore Assistant Traveling Auditor, has been appointed Chief Traveling Auditor with office at Detroit, Mich. F. D. Hull, Adrian, Mich.; C. H. Whitmore, Toledo, O., and H. Bethune, Hillsdale, Mich., heretofore Assistant Traveling Auditors, have been appointed Traveling Auditors, with headquarters at the same places.

Louisville & Nashville.—R. J. Wemyss has been appointed General Land Commissioner with office at Pensacola, Fla., succeeding F. B. Bonifay, previously Acting General Land Commissioner.

Merchants' Despatch Transportation Co.—Harry B. Tindall, heretofore Foreign Freight Agent of the Boston & Albany at Boston, has been appointed General Eastern Agent of the Merchants' Despatch Transportation Co. with office in New York.

Mobile & Ohio.—Henry Fonde has been appointed Superintendent of the new division recently opened from Columbus, Miss., to Tuscaloosa, Ala. (Railroad Construction column.)

New York Central & Hudson River.—O. E. Jenkins, heretofore General Western Passenger Agent at Chicago of the Rome, Watertown & Ogdensburg Division, has resigned. W. B. Jerome, General Western Passenger Agent of the New York Central & Hudson River at Chicago, has assumed his duties.

New York, New Haven & Hartford.—F. B. Smith has had his title changed from Master Mechanic to General Master Mechanic. His headquarters remain at New Haven, Conn.

North Michigan Transportation Co.—B. L. Church has been appointed General Freight and Passenger Agent, with office at Chicago, succeeding L. E. Burke, resigned.

North Shore Despatch.—J. Samuel Chase, Commercial Agent of the Michigan Central at Buffalo, has been appointed Agent of the North Shore Despatch with office in the same city, in addition to his present duties.

Pecos Valley & Northeastern.—The officers of this company, successor to the Pecos Valley, referred to in the Construction column, are as follows: President, J. J. Hagerman; Vice-President, Charles A. Otis; Treasurer, Percy Hagerman; General Manager, E. O. Faulkner; Chief Engineer, W. S. Ballard. The principal office is at Colorado Springs, Colo.

Pennsylvania Co.—W. F. Beardsley, Master Mechanic of the Allegheny shops, has had his jurisdiction extended over the Erie & Ashtabula Division, his headquarters remaining at Allegheny, Pa. T. A. Kircher has been appointed Assistant Master Mechanic at the Allegheny shops. The appointments took effect April 1.

Philadelphia & Reading.—E. B. Crosley, heretofore Resident Manager at Chicago of the Philadelphia & Reading Coal and Iron Co., has been appointed Assistant General Freight Agent of the Philadelphia & Reading in charge of through traffic, with office at Reading Terminal, Philadelphia, succeeding F. W. Fowkes, transferred. (April 1, p. 245.)

Pittsburgh, Bessemer & Lake Erie.—Dr. B. E. Mossman of Greenville, Pa., has been appointed Surgeon, with office at Pittsburgh, Pa.

Queen & Crescent.—Edward Ford has been appointed Superintendent of the Alabama & Vicksburg, and the Vicksburg, Shreveport & Pacific, succeeding W. W. Bond, resigned, effective April 1.

Rosenberg, Damon Mound & Gulf.—At a meeting of the directors of this company, referred to in the Construction column, held at Rosenberg, Tex., March 26, officers were elected as follows: President, S. C. Brasher, Houston; First Vice-President, R. T. Mulcahy, Rosenberg; Secretary, George B. Lang, Rosenberg; Treasurer, W. N. Worthington, Rosenberg; Attorney, Noah Allen, Galveston, Tex.; Chief Engineer, W. R. Stockwell of Alvin, Tex.

St. Louis & San Francisco.—C. H. Beggs, Secretary to Vice-President and General Manager B. F. Yoakum, has been appointed Purchasing Agent in addition to his present duties. His office will be at St. Louis, Mo.

St. Louis, Avoyelles & Southwestern.—The officers of this company are as follows: William H. Peterman and H. H. Youree, Receivers; President, Mr. Peterman; Auditor and Cashier, W. J. Raef, with offices at Marksville, La. W. E. Pearce is General Freight and Passenger Agent with headquarters at Bunkie, La. (Railroad news column, March 18, p. 210.)

Seaboard Air Line.—F. A. Bayles has been appointed Soliciting Freight Agent, representing the joint interests of the railroad and steamship lines, with office at 371 Broadway, New York, appointment effective April 1.

Shelbyville & Bloomfield.—William Tayloe, Assistant General Passenger Agent of the Southern at Louisville, Ky., has been elected a director of the Shelbyville & Bloomfield. (Railroad News column, April 1, p. 248.)

Southern.—W. J. Hurlbet has been appointed to the new office of Agent of the Land and Industrial Departments with headquarters at Chattanooga, Tenn.

Southern Pacific.—Charles W. Bein, Traffic Manager of the Southern Pacific lines in Texas since 1893, with headquarters at Houston, Tex., has been appointed Traffic Manager of Morgan's Louisiana & Texas Railroad & Steamship Co., and the Louisiana Western Railroad in addition to his present duties, succeeding the late J. G. Schriever. His headquarters remain in Houston.

Staten Island.—At the annual meeting of this company, which is controlled by the Baltimore & Ohio, held in New York April 5, the following directors were elected: J. F. Emmons, Charles H. Bass, A. Harrman, L. De Jonge, Jr., E. P. Goodwin, George F. Kreischer, James M. Fitzgerald, J. J. Winants, C. H. White, K. P. Emmons, S. H. Curry, C. F. Zentgraf and William King.

Terre Haute & Indianapolis.—Thomas W. Demorest, heretofore foreman of the Pittsburgh, Chicago & St. Louis shops at Indianapolis, Ind., has been appointed foreman of the Terre Haute & Indianapolis shops at Terre Haute, Ind., succeeding W. F. McKeen, Jr., resigned. (March 18, p. 208.)

Tiffin & Northwestern.—Charles Watts, General Superintendent of the Pennsylvania Co. at Pittsburgh, Pa., has been elected a director of the Tiffin & Northwestern, which is part of the Pennsylvania Co.

Traders' Despatch.—Lafayette Briggs, who was recently appointed Manager with office at Buffalo, N. Y., will on May 1 transfer his office from Buffalo to Chicago, Ill.

Union Pacific.—Dr. A. F. Jonas of Omaha, Neb., has been appointed Chief Surgeon, succeeding Dr. W. J. Galbraith.

Wabash.—J. A. Richardson, heretofore Canadian Passenger Agent, with office at Toronto, has been appointed District Passenger Agent with headquarters at Toronto and St. Thomas. He will have immediate supervision over passenger business originating in Canada.

Wisconsin & Michigan.—J. C. Fitzgerald has been appointed General Agent of the Wisconsin & Michigan Ry., and also the Lake Michigan Car Ferry Transportation Co., with office in the Old Colony Building, Chicago, Ill.

RAILROAD CONSTRUCTION.

Incorporations, Surveys, Etc.

ATCHISON, TOPEKA & SANTA FE.—Official statement is received that this company proposes to double-track its line from Emporia, Kas., to Sterry, 6 miles, and from Evans through Elmdale and Clements to Cedar Grove, about 14 miles. The contracts for grading between Emporia and Sterry have been let to W. P. Wilcox of Evans, and from Evans to Cedar Grove to J. D. McDonald of Pueblo, Colo., and the J. A. Ware Construction Co. of St. Louis, Mo. This work is progressing rapidly. The maximum grade is 0.3, which occurs only in one place and for a comparatively short distance. The maximum curvature is 3 degrees, and that for one curve only. On the balance of the line there are several curves of 1 degree each. There are five bridges or arch culverts to be built between Emporia and Sterry and eleven between Evans and Cedar Grove. The bridges, outside of arch culverts, will be I beams and deck girders on masonry. Contracts for masonry have already been let to L. W. Lewis of Emporia. The bridges will be built by the company's own forces. The line will be laid with 75-lb. rail, which has already been purchased and is on the ground. (March 25, p. 225.)

BURLINGTON & MISSOURI RIVER.—Official denial is received of the report that this company intends to build a line between Deadwood, S. D., and New Castle, Wyo. (March 25, p. 224.)

CANADIAN YUKON RAILWAY & TRANSPORTATION CO.—The Dominion Senate, by a vote of 52 to 14, has held up the Yukon Railway bill granting this company permission to build an all Canadian line to the Klondike. This is the line for which a contract was entered into with the firm of McKenzie & Mann of Toronto, as detailed in this column for Feb. 4.

CHICAGO & NORTHWESTERN.—This company is reported to have closed negotiations with the Manitowoc Water-works of Manitowoc, Wis., for laying tracks through its property, and a belt line is to be completed around the south side of the city with side tracks on the lake front. This will require about two miles of track.

CHICAGO HEIGHTS TERMINAL TRANSFER.—This company has been incorporated in Illinois with a capital stock of $500,000 to build and operate a road from a point in the town of Bloom, Cook Co., near Chicago, to the various railroads and factories in that town. The incorporators and first Board of Directors are: Charles H. Walker, Francis Lackner, Lee Fox, Rudolph Brand and M. H. Kilgaxlen, all of Chicago.

CHICAGO, ROCK ISLAND & PACIFIC.—Official information has been received that the connection has been completed and trains are operated over it beginning April 1. The track has been completed jointly by the Atchison, Topeka & Santa Fe and this company, and arrangements have also been made by which both companies are using one line of track between Atchison & St. Joseph, Mo. About three years ago the Missouri River cut out the portion of this connection which is now completed. (Feb. 12, p. 110.)

CHICAGO TERMINAL TRANSFER.—The proposed extension of this company's tracks is from Franklin Park, just west of the city limits of Chicago, east 6.75 miles to Mayfair within the city limits, where connection is to be made with the Chicago, Milwaukee & St. Paul and the two branches of the Chicago & Northwestern. Right of way has been acquired, and bids for grading have been asked, but beyond this no work has been completed. All material has been bought and no extra rolling stock will be required. Grading is comparatively light. There will be only one bridge of importance, that over the Desplaines River, with a span of 125 ft. (March 18, p. 208.)

COAHUILA & ZACATECAS.—The last spike has been driven, according to report, on this narrow gage line from Saltillo, State of Coahuila, Mex., southwest to Concepcion de Oro, 85 miles. (Jan. 14, p. 34.)

COLORADO & NORTHWESTERN.—This company has decided, according to report, to begin at once building its proposed extension from Sunset on the main line southwest to Eldora. (For map showing route, see this column for March 4, p. 169.)

COLORADO VALLEY.—Bonds for a large portion of this new road, according to report, have been sold and delivered for cash, and contract has been closed with Robert S. Doubleday of San Antonio, Tex., for building the entire road north and south. J. W. Germany of Henderson County has been given the contract for ties and bridge timbers. W. N. Cameron, R. S. Rowen, F. F. Rowen and J. D. O'Daniels of Coleman have been given the town site and colonization privileges along the line. Grading was completed a month ago from Sweetwater, Tex., to Oakhurst, 25 miles, and trains are running to Adaville 7½ miles. The proposed line is from Sweetwater southeast to San Antonio and Austin. Irving Wheatcroft of Sweetwater is Vice-President and General Manager. (March 11, p. 188.)

DELAWARE, LACKAWANNA & WESTERN.—Nothing has yet been done with reference to the proposed spur at Little Falls, N. J., to the property of the East Jersey Water Co. The work would be a side track about a mile long. Very little grading would be required and the grade would be light. (March 25, p. 224.)

DENVER & RIO GRANDE.—With reference to the report that this company is to extend its line into the interior of New Mexico, official statement is received that there is no intention of any additional construction this year in that direction. (March 25, p. 224.)

ELK & HIGHLAND.—This company has been incorporated in Pennsylvania with a capital stock of $102,000 to build a line in Elk County from Coon Run to Portland, 17 miles. D. H. Miller of Kane, Pa., is President.

FLORIDA, ALABAMA & NORTHERN.—A letter from this company states that nothing has yet been done with reference to the proposed line from Elba, Coffee Co., Ala., southwest about 125 miles to Pensacola, Fla., but that surveys will probably be begun in May. W. B. Wright, Pensacola, Fla., is President. (Aug. 26, 1897, p. 611.)

FORT WORTH & NORTHWESTERN.—Preliminary surveys are reported to have been completed on

this line projected to run from Fort Worth, Tex., northwest about 120 miles to Throckmorton, and location will be made at once. B. B. Paddock, Mayor of Fort Worth, is among those interested.

GALVESTON, LAPORTE & HOUSTON.—A contract has been entered into with the United States Government by this company, according to report, to build a spur from its round house in Galveston, Tex., about ¾ of a mile to the site of the new fort in the Denver Re-Survey. The purpose is to facilitate the transportation of guns and ammunitions of war from the city to fortifications.

GEORGIA PINE.—This company intends to begin the extension north to Dawson, Ga., from Damascus. Application has been made in Florida for a charter to Tallahassee and the same has been granted to the state of Georgia in that direction. The company intends to make the extension in both directions but no work has been done so far other than that of surveying. (March 18, p. 208.)

GUADALUPE VALLEY.—Surveys have been completed, according to report, for the section of this road north about 90 miles to Smithville, Tex., from Victoria, by way of Yoakum, where connection will be made with the Missouri, Kansas & Texas. The section of the road from Victoria south to Alligator Head on the Gulf Coast is now being built. The company is also running a line from Victoria east about 120 miles via Alvin to Galveston. Uriah Lott of Victoria, Tex., is President and General Manager. (March 25, p. 224.)

GULF, BEAUMONT & GREAT NORTHERN.—This company has been organized in Texas with a capital stock of $600,000 to take over the property of the Gulf, Beaumont & Kansas City and to make further extensions. The new line will extend from Sabine Pass on the Gulf of Mexico, north about 300 miles through Beaumont, Jasper, San Augustine Center, Carthage, Marshall and Jefferson to Paris, a point on the Texas & Pacific. Of this the old Gulf, Beaumont & Kansas City extends from Beaumont to Kirbyville, 51.82 miles. It is also understood that the new company will take possession of the Jasper Southern, which has been graded by the people of Jasper from Kirbyville north to Jasper. Another branch is proposed from Jasper northwest about 250 miles through Lufkin, Palestine, Corsiana and Dallas to Fort Worth. The officers and directors are given under Elections and Appointments.

ILLINOIS CENTRAL.—Grading has been completed and track laid on the entire extension of the Chicago & Texas line of this company from McClure, Ill., south to Gray's point on the east bank of the Mississippi. Ballasting has not yet been done and no regular train service established. (Feb. 18, p. 130.)

This company intends to improve its line between Fulton, Tenn., and Memphis during the coming season and the Board of Directors has appropriated the sum of $1,200,000 for the purpose of reducing grades and changing the line. Contracts for part of the work have already been let and operation and the improvements have been begun.

In Murphysboro, Ill., an extension of two miles will be built to connect the tracks of the old Cairo Short Line with the Chicago & Texas line of this company. The contract for grading has been let to McArthur Bros., and for masonry to J. R. Fulton & Co. of Chicago. Work has not yet been begun. The grading is quite heavy and there will be three bridges over streets, each about 40 ft. long, and one over the Muddy River 320 ft. in length.

The citizens of Dyersburg, Tenn., are reported to have raised the amount asked for by the railroad company to assist in extending the line from Dyersburg north about 5 miles to the Obion River into timber lands.

KANSAS & SOUTHEASTERN.—Official statement is received that about 7 miles has been graded on this line from Hunnewell, Kas., on the Atchison, Topeka & Santa Fe, southeast via Braman, Okla. Ter., 6 miles, to Kay Center, 11 miles, making a total of 17 miles. Forty teams and two grading machines are at work. The work is light, the maximum grade being 1 per cent., and the maximum curve 4 degrees. There are no bridges or trestles of importance. The officers are given under Elections and Appointments.

KANSAS CITY, ELDORADO & SOUTHERN.—At a meeting of the stockholders held at Rich Hill, Mo., March 31, the directors were authorized to dispose of gold bonds to the amount of $450,000 necessary for building and equipping the proposed line from Rich Hill, Mo., a point on the Kansas City, Fort Scott & Memphis, northwest 40 miles to Eldorado Springs. According to report, a large force of men is now building the road.

KANSAS CITY, FORT SCOTT & MEMPHIS.—This company will lay about 30 miles of 75-lb. rails east of Springfield, Mo. About 3½ miles of this is just east of Turner and the balance between Hardy and Black Rock, Ark.

KANSAS CITY, PITTSBURGH & GULF.—Official statement is received that grading, which was commenced in January, was completed early in March on the Fort Smith branch, which begins at Oak Lodge, on the main line, about four miles south of the Arkansas River in Indian Territory, and runs northeast 16 miles to Fort Smith, Ark. Bernard Corrigan of Kansas City, Mo., is the principal contractor. The Poteau River is crossed about one mile south of Fort Smith by 200 ft. through truss spans flanked on either end by a 50-ft. deck plate girder with 1,300 ft. of pile approach on the west side of the river. The substructure is now completed, consisting of two concrete piers for the 200 ft. span, 5 ft. 6 in. x 22 ft. 6 in. at the base, batter 1 in 12, height under coping 38 and 43 ft. The ends of the 50 ft. girders rest on pile piers of two bents each, five piles to each bent. Track laying has been begun and will be finished this month. (March 4, p. 170.)

LEHIGH VALLEY.—The Seneca County extension of this road from Geneva Junction, N. Y., east to Seneca Falls, eight miles, is practically completed. (Feb. 25, p. 148.)

MEMPHIS & SUNFLOWER RIVER.—The Governor of Mississippi has issued a proclamation for the organization of this company to build a line from Indianola, a point on the Southern in Sunflower County, north through Dockery to the northern boundary of the county, with another line from Dockery west through Boyle to the Mississippi River. This includes the ownership of the Boyle & Sunflower River, which was completed from Dockery to Boyle in 1895 and extended west 9 miles from Boyle last year. Among those interested are: A. T. Averill, W. H. Durin, George T. Hedges, C. M. Averill and H. T. Hedges, all of Cedar Rapids, Ia.

MISCELLANEOUS COMPANIES.—The Washington Improvement & Midland Development Co. of Spokane was incorporated in Washington state March 8, with a capital stock of $500,000 to deal in mining properties, development and sale of water and water power, operate telephone and telegraph lines and steamboats and to build and operate railroads. W. E. Pierce and A. A. Newberry of Spokane and L. E. Marsh of San Francisco, Cal., are among the incorporators. The principal place of business is Spokane. The company proposes to do business in Washington, Idaho, Oregon and British Columbia. A bill is before Congress to grant right of way for a railroad for this corporation across the Colville Indian Reservation.

The W. P. Chapman Co. was incorporated in Virginia March 31 to build, equip and improve railroads, bridges, tunnels, depots, section houses and structures used by railroads. The officers are: President, W. P. Chapman of New York; Treasurer, O. E. Phelps of Alabama, and Secretary, E. W. Jackson of Chicago. These, with T. Mahoney and William Henry Mann, are the Directors. This company has obtained the contract for building the Richmond, Petersburg & Carolina.

MISSOURI & IOWA SOUTHERN.—Building has not yet been begun on this road except to break ground, make surveys, estimates, etc., and to acquire the right of way. The proposed line is to extend from Sedalia, Mo., north 50 miles to Miami on the Missouri River. J. E. House of Sedalia, Mo., is Chief Engineer. (Oct. 29, 1897, p. 775.)

MOBILE & OHIO.—The section of this road from Columbus, Miss., southeast to Tuscaloosa, Ala., 90 miles, was opened for traffic March 31 and work is being rapidly pushed forward on the extension to Montgomery, Ala. (Feb. 25, p. 148.)

NEW ORLEANS & NORTHWESTERN.—Application has been made by this company to the New Orleans City Council for a franchise to connect its tracks with those of the Yazoo & Mississippi Valley on Broadway, requiring about one mile of track.

NORTHERN PACIFIC.—Wren & Greenough are reported to have obtained a contract for general track and road bed repair work from Cheney, Wash., southwest to North Yakima. No sub-contracts will be let. The improvement consists of embankments, ditching, ballasting and re-laying 50 miles of track between Cheney and Pasco. The new rails will be 72-lb. to replace 56-lb. rails. In many places grades are to be improved.

OREGON RAILROAD & NAVIGATION CO.—Official statement is received that this company has reduced the curvature in its lines between Cascade Locks and The Dalles over 1,000 degrees within the past few months and has just closed a contract for work equally great to be completed by July 1. The company will re-lay at least 68 miles of new rails before that date, has ballasted 65 miles of track and will expend in improvements and betterments over $500,000, as against $159,000 the previous year, all of which will be charged into operating expenses.

PECOS VALLEY.—Official information is received that the reorganized company, to be known as the Pecos Valley & Northeastern, will own the present line from Pecos City, Tex., north to Roswell, N. M., and also the proposed extension from Roswell to Amarillo, Tex. This extension will cross the Pecos River about 15 miles north of Roswell and will pass through the town of Canyon City, terminating at Amarillo, where connection will be formed with the Atchison, Topeka & Santa Fe and with the Fort Worth & Denver City. Location is practically completed, and it is expected that contracts for building will be let in two weeks. The character of the work is very easy, the maximum grades being 1 per cent. and maximum curves 3 deg. At the crossing of the Pecos River and of the Palo Duro Canyon some heavy embankments will be necessary, but in general light embankments will rule, as the country through which the survey passes is mostly flat prairie. There will be no iron nor steel bridges. Trestles about 600 ft. long will be required at the Palo Duro and Pecos River crossings. The road will be laid with 56-lb. rails, about 20,000 tons being required. These have already been contracted for as well as ties and other track material. The amount of rolling stock to be purchased has not yet been determined upon. The officers are given under Elections and Appointments. (April 1, p. 246.)

PHILADELPHIA & READING.—This company is pushing track improvements on the mountain grades between Hunter's Run, Pa., and Zion's Church on the Gettysburg & Harrisburg branch. Eighty-pound rails are being used to replace the lighter rails. The company is also building an 800-ft. siding at Mt. Holly, Pa.

PLANTERS' TERMINAL.—Application has been made for a charter in Texas by this company to build a line in Grayson County from Sherman, a point on the Missouri, Kansas & Texas, south 16 miles to Van Alstyne. The promotors are residents of Grayson County.

PRESCOTT & EASTERN.—Grading is reported to have been begun on this line from a point near Prescott, Ariz., on the Santa Fe, Prescott & Phoenix, south 26.4 miles to Mayers. F. M. Murphy of Prescott is President. (Feb. 18, p. 130.)

ROSENBERG, DAMON MOUND & GULF.—At a meeting of the directors held at Rosenberg, Tex., March 26, it was determined to begin preliminary surveys at once. The proposed road is from Rosenberg south about 20 miles to Damon Mound, Brazoria Co. It is stated that active building will begin about July 1. The company was incorporated in Texas, March 12. The officers are given under Elections and Appointments. (March 18, p. 208.)

SOUTHERN.—Official confirmation is received that this company is surveying a line from Stevenson, Ala., northeast to Chattanooga, Tenn. This is to form a part of the company's study of the question, but no plans have been decided upon. (Apr. 1, p. 246.)

SOUTHERN PACIFIC.—Official statement is received that the spur track of the Austin & Northwestern line of this road, on the main line two miles west of Fairland, to Sandstone Mountain, Tex., a distance of 1⅛ miles, has been completed, and the quarry is in operation. (Feb. 11, p. 110.)

SPOKANE FALLS & NORTHERN.—The Dominion Parliament has granted the charter for the extension of this road down the Kettle River from Greenwood City to the international boundary. (Mar. 25, p. 224.)

TERMINAL RAILWAY OF BUFFALO.—Grading has been completed on the entire 10½ miles of this road which is to connect the Lake Shore & Michigan Southern at Blasdell, N. Y., with the New York Central & Hudson River at Depew. Track has been laid but no ballasting done. The remaining work is filling in at the two ends of the line. The steel bridges are progressing rapidly. Altogether there are about 500 men and three steam shovels at work. The Pennsylvania Steel Co. and the Elmira Bridge Co. have contracts for the railroad bridges, and the Buffalo Bridge & Iron Co. has completed the road bridges. (July 9, 1897, p. 499.)

VALASCO TERMINAL.—An extension of this line, according to report, is to be made from Velasco, Tex., southeast 4½ miles to Surfside, on the Gulf of Mexico.

Electric Railroad Construction.

ALLENTOWN, PA.—Press reports state that the franchises of the Allentown & Reading Electric Railway for building a trolley line from Allentown to Kutztown have been disposed of by Col. S. D. Lehr to another company, which will apply for a charter. Some rights of way still remain to be secured. Col. Lehr recently wrote the Railroad Gazette that he had this franchise for sale, saying that it included 1½ miles already built within the city limits of Allentown and some material for further construction. The proposed route covers about 21 miles.

ATLANTA, GA.—Press reports state that the Collins Park & Belt Railroad will build an extension to Marietta, Cobb County, about 19 miles.

The Atlanta Consolidated Street Railway Co. will build about three or four miles of additional track this year.

BRIDGEPORT, CONN.—The Bridgeport Traction Co. has commenced work on the Southport-Westport extension of four miles. It will be completed by June 15. (Feb. 18, '98, p. 131.)

CHICAGO, ILL.—The City Council has granted a franchise to the Calumet Electric Street Ry. for the extension of the road from Sixty-third to Sixty-fourth Sts. on Stony Island Ave. Although the extension will be only one block, it will bring the Calumet road to the station of the South Side Elevated, and the surface cars will turn on a loop constructed on private property.

On March 30 Judge Brentano issued an injunction on application of Monigomery Ward & Co. restraining the Chicago City Railway from erecting an overhead trolley system on Michigan Ave. between Madison and Randolph Sts., and east of property owned by complainants. The injunction demanded was based on a decision of the Supreme Court of Nov. 8, 1897, which declared that Michigan Ave. and the Lake Front Park between Madison and Randolph Sts. had been dedicated to park purposes and were held in trust by the city of Chicago only for such purposes. Complainants aver that the court also held that any owner of property abutting on Michigan Ave. should have the right to enjoin threatened encroachments. This injunction will interfere with the temporary trolley line for which the Chicago City Railway had received a permit. (April 1, p. 246.)

CUMBERLAND, MD.—The Cumberland Electric Railway Co. will make extensions of four miles.

MEMPHIS, TENN.—The Memphis Street Railway Co. is building an extension to Montgomery Park, a distance of five miles.

EAST WINDSOR, CONN.—Concerning the East Windsor Electric Railroad Co., in which Mr. C. E. Woodward of Warehouse Point is interested, we are informed that the proposed trolley road is for only 4½ miles to fill the gap to the continuous road between Hartford, Conn., and Springfield, Mass., on the east side of the Connecticut, and that the road will probably be absorbed and built by the Hartford Street Railway Co.

JOLIET, ILL.—Articles of incorporation were filed with the Secretary of State on March 30 by the Joliet Railroad Co., capital $600,000. The company is to construct and operate electric street railroad lines in Joliet and other towns, with authority to sell power, light and heat for manufacturing and other purposes. The incorporators are C. C. Rush, of Joliet, W. H. Heun and A. P. Bischmann. The Joliet Railroad Co. has been known as the Joliet Railway Co., the name being changed by the new incorporation. The road has already 17.5 miles of track and 26 motor cars, and will build five miles of new track this spring. W. B. McKinley is Secretary and General Manager, and C. C. Rush, Superintendent and Purchasing Agent.

LAPORTE, IND.—Concerning the projected electric railroad to be built from Laporte to Michigan City, 13 miles, we are informed that the company is not yet completed, but Mr. J. W. Lovett will probably be President and Mr. W. W. Huffman Secretary and Manager, both of Anderson, Ind. No contracts have yet been let.

MONONGAHELA CITY, PA.—The Monongahela City Street Railway Co. contemplates extending its tracks south to Black Diamond and north to Courtney.

NEW BEDFORD, MASS.—The New Bedford, Middleboro & Brockton Street Railway Co. was granted a franchise in the towns of Middleboro, Bridgewater, Lakeville and Freetown. (Feb. 18, p. 131.)

NEWARK, N. J.—President E. F. C. Young of the Consolidated Traction Co. is reported to have said that the first work of the North Jersey Traction Co., which recently leased the lines of the Consolidated Co., will be to push the proposed extensions in the western part of Essex County and especially to develop the eastern part of Newark.

NEW YORK, N. Y.—The Second Ave. cars of the Metropolitan Traction Co. commenced running by conduit electric conductors April 3 from 129th St. to Stuyvesant Pl., thence to Fourth Ave., Bowery and Center St. to City Hall.

PORTSMOUTH, N. H.—Negotiations have been concluded providing for a transfer of the charter and stock of the Portsmouth Street Railroad Co. to the Portsmouth & Dover Railroad Co., a branch of the Boston & Maine. The Portsmouth & Dover will now proceed to build the projected electric street line in Portsmouth and as far as Rye, the other company retiring from the field. It is also understood that the Boston & Maine will electrify the steam railroad from Portsmouth to Dover, a distance of 10 miles.

QUINCY, MASS.—The Quincy & Boston Street Railway Co. has applied to the city government of Boston for the right to extend its tracks along Neponset Ave. A hearing will be given April 18.

TIFFIN, O.—The Tiffin, Fostoria & Eastern Electric Railway Co. has now in operation 6½ miles of its road. The company is in the market for the material for overhead and track work 7½ miles more, which it is intended to have in operation this year.

WHITEHALL, N. Y.—A company is being formed to build an electric railroad to connect Whitehall and Granville. Mr. H. G. Burleigh is said to be interested.

GENERAL RAILROAD NEWS.

Railroad Earnings.

Showing the gross and net earnings for the periods ending at the dates named:

February 28:		1898.	1897.	Inc. or Dec.	
Buffalo, Rochester & Pittsburgh.					
1 month	Gross	$258,858	$235,731	I.	$23,127
1 "	Net	91,966	81,830	I.	10,136
Denver & Rio Grande.					
1 month	Gross	$566,716	$435,953	I.	$130,763
1 "	Net	219,082	166,500	I.	52,582
8 months	Gross	5,686,811	4,690,517	I.	996,294
8 "	Net	2,244,989	1,877,168	I.	367,821
Fitchburg.					
1 month	Gross	$520,726	$482,906	I.	$37,820
Kansas City, Fort Scott & Memphis.					
1 month	Gross	$423,696	$391,431	I.	$32,265
1 "	Net	143,383	142,645	I.	738
8 months	Gross	3,471,320	3,094,548	I.	376,772
8 "	Net	1,085,352	1,012,092	I.	73,269
Lehigh Valley.					
1 month	Gross	$1,421,806	$1,301,671	I.	$120,135
1 "	Net	351,834	233,640	I.	118,194
3 months	Gross	4,304,657	4,157,331	I.	147,326
3 "	Net	1,116,994	794,558	I.	322,436
Louisville & Nashville.					
1 month	Gross	$1,754,984	$1,567,827	I.	$187,157
1 "	Net	550,699	525,545	I.	25,154
8 months	Gross	14,636,482	13,763,261	I.	873,221
8 "	Net	4,988,990	4,550,582	I.	438,408
Mexican Central.					
1 month	Gross	$1,052,097	$1,007,224	I.	$44,873
1 "	Net	248,791	332,398	D.	83,607
2 months	Gross	2,139,119	2,081,126	I.	57,993
2 "	Net	528,079	709,909	D.	181,830
New York, Ontario & Western.					
1 month	Gross	$258,945	$258,234	I.	$711
1 "	Net	57,773	61,604	D.	3,831
8 months	Gross	2,729,313	2,641,808	I.	87,405
8 "	Net	833,683	800,428	I.	33,255
Norfolk & Western.					
1 month	Gross	$876,368	$759,493	I.	$116,875
1 "	Net	241,796	173,035	I.	38,761
8 months	Gross	7,564,272	7,059,186	I.	505,086
8 "	Net	2,408,613	1,707,090	I.	701,523
Pennsylvania.					
1 month	Gross	$4,829,534	$4,486,234	I.	$343,300
1 "	Net	1,359,101	1,293,401	I.	65,700
2 months	Gross	9,918,705	9,241,905	I.	676,800
2 "	Net	2,512,098	2,419,698	I.	92,400
Pennsylvania Company.					
1 month	Gross	.....	.....	I.	$337,000
1 "	Net	.....	.....	I.	40,700
2 months	Gross	.....	.....	I.	871,700
2 "	Net	.....	.....	I.	119,500
Philadelphia, Wilmington & Baltimore.					
1 month	Gross	.....	.....	I.	$58,600
1 "	Net	.....	.....	I.	29,300
4 months	Gross	.....	.....	I.	272,300
4 "	Net	.....	.....	I.	99,500
Wabash.					
1 month	Gross	$952,812	$862,859	I.	$89,953
1 "	Net	264,054	273,613	D.	9,559
8 months	Gross	8,708,037	7,831,975	I.	876,062
8 "	Net	2,700,369	2,370,940	I.	329,429

BALTIMORE & OHIO.—J. P. Morgan & Co. of New York announce that, in view of the default in interest on the 6 per cent. Parkersburg gold bonds due April 1, 1919, all holders of such bonds are notified to deposit the same with them for protection under a bondholders' agreement, and transferable receipts will be issued for the same. (April 1, p. 247.) The reorganization bill has passed both houses of the Maryland Legislature. (March 11, p. 187.)

CHICAGO & NORTHWESTERN.—Holders of sinking fund bonds of 1879 are notified that 18 of the 5 per cent. and nine of the 6 per cent. bonds have been drawn for payment at 105 and accrued interest, and they are requested to deposit the same with the Farmers' Loan & Trust Co., New York. Interest ceased Feb. 1. (Jan. 7, p. 17.)

CHICAGO GREAT WESTERN.—A special meeting of the stockholders will be held June 1 at Chicago for the purpose of voting on the proposition to fund its indebtedness, including the proposition to complete and improve its line of railroad. It is proposed to increase the 4 per cent. debenture stock from $15,000,000 to $30,000,000. The object of the meeting is to meet the requirement of the Illinois law in carrying out the plan approved by the London meeting of the debenture and preferred A stockholders to increase the legal limit of the debenture bonds. The vote at the annual meeting of the stockholders Jan. 12 for this increase was simply a preliminary legal requirement to create a reserve of debenture stock for the purpose of redeeming any or all of the liabilities of the company, which are a charge prior to the 4 per cent. debenture stock, and for the purpose of making improvements to the property of the company. If the purpose is carried out the result will be a saving of about $75,000 per year interest. None of the new debenture stock can be issued except by further consent of the Finance Committee. (Feb. 4, p. 89.)

CHICAGO JUNCTION.—This new company began operation April 1. It is the consolidation of a number of railroad companies in the vicinity of Chicago, shown in the circular issued by the company as follows:

To Connecting Lines: The railroad system of the Union Stock Yard & Transit Co., heretofore known as the "transit department" of that company, has been leased to the Chicago & Indiana State Line Railway Co., and a consolidation has been had between the Chicago & Indiana State Line Railway Co. and the Chicago, Hammond & Western Railroad Co., under the name of Chicago Junction Railway Co. This company, therefore, now controls and operates the tracks and other railroad property heretofore known as Union Stock Yard & Transit Co. (transit department), Chicago & Indiana State Line Railway Co., Chicago, Hammond & Western Railroad Co. On all business prior to April 1 remittances should be made to and all bills rendered against the companies indicated as owners prior to the consolidation, and upon business April 1 and thereafter all remittances and reports should be made to and bills rendered against the Chicago Junction Railway Co., and through the officers as indicated.

The officers are given under Elections and Appointments. (Feb. 11, p. 111.)

CHICAGO, ROCK ISLAND & PACIFIC.—This company notifies the holders of its extension and collateral 5 per cent. bonds of 1884, that it will redeem the entire issue at 105 and interest at the office of the Central Trust Co., New York, on and after April 30, interest ceasing after that date. This is in accordance with the refunding plan heretofore described. (Feb. 18, p. 131; Feb. 25, p. 150.)

COLORADO MIDLAND.—Holders of certificates of deposit of the Central Trust Co. of New York for 6 per cent. first mortgage and 4 per cent. consolidated mortgage bonds are notified that on and after April 6 these may be exchanged for new securities under the plan of reorganization. Holders of Aspen Short Line bonds are requested to surrender these bonds to the Central Trust Co. with all unpaid coupons attached on and after April 6, and to receive in exchange $1,000 Colorado Midland 4 per cent. first mortgage 50-year gold bonds and $500 4 per cent. non-accumulative preferred stock floating trust certificates for each bond. (Dec. 24, 1897, p. 919.)

FORT PLAIN & RICHFIELD SPRINGS.—In the case of Richard B. Wick to foreclose mechanic's lien for $1,500 on this company, the appellate division of the Supreme Court at Rochester, N. Y., has decided in favor of the plaintiff. This property was advertised for sale at Herkimer, N. Y., Dec. 7, 1897, by J. A. Steele, the referee, but the sale was postponed after the company had given a bond. It is stated that the entire road from Richfield Springs to Fort Plain, 22 miles, is graded and bridge abutments built, but no rails have been laid. (Dec. 24, 1897, p. 807.)

HOUSATONIC.—A certificate was filed with the Connecticut Secretary of State March 29, whereby this road becomes an integral part of the New York, New Haven & Hartford. It has been operated by that road since July 1, 1892, under a lease for 99 years, the lessee assuming all obligations on account of interest, rentals, etc., and guaranteeing dividends of 1 per cent. per annum on preferred stock. All the stock of the company except one small block was acquired by the New York, New Haven & Hartford several years ago, and recently this last block was sold, making the New York, New Haven & Hartford entire owner. This road extends from Bridgeport, Conn., to the Massachusetts State line, 74.97 miles, with branches from Brookfield Junction to Danbury, 5.36 miles, and from Botsford to Huntington, 9.79 miles, making a total of 90.12 miles. It was chartered in May, 1836, and completed Dec. 1, 1842. It has $23,000 common stock and $2,875,800 preferred stock, with a funded debt of $3,000,000. Common stock is exchangeable for preferred stock at the rate of one share of preferred for one and a half of common.

KANSAS PACIFIC.—At midnight, March 31, this road passed from the hands of the receivers to President Burt of the Union Pacific, representing the Reorganization Committee. The road was sold to the reorganization committee Feb. 16.

KNOXVILLE & BRISTOL.—This company, incorporated in Tennessee, March 15, has succeeded to the property of the Morristown & Cumberland Gap, which was sold Feb. 19 to Adolph Segal, of Philadelphia, Pa. The line extends from Morristown, Tenn., to Corryton (40 miles), and the charter permits an extension to Bristol on the northern border of the state. The new officers of the company are given under Elections and Appointments. (March 18, p. 208.)

LEHIGH VALLEY.—Holders of first mortgage bonds maturing June 1 ($5,000,000 outstanding) are notified that Drexel & Co., Philadelphia, Pa., will purchase the same at par on June 1. This house has made agreements with the railroad company to extend the bonds purchased for a period of 50 years, with interest at 4 per cent. per annum, payable June 1 and Dec. 1 of each year.

MEXICAN NATIONAL.—Holders of first-mortgage 6 per cent. 40-year bonds are notified that 106 of these for $1,000 each have been drawn for payment at the office of Matheson & Co., London, at par June 1.

NASHVILLE, FLORENCE & SHEFFIELD.—The Louisville & Nashville has sued this company for $746,315, due by promissory note made Nov. 26, 1896, and payable one year from date. The debt is for operating expenses of the Nashville, Florence & Sheffield, of whose stock the Louisville & Nashville owns a majority, and guarantees the principal and interest on the bonds by indorsement. The line extends from Columbia, Tenn., to Sheffield, Ala., 82.13 miles; from Iron City, Tenn., to Pinkney, 11.78 miles; from Summertown to Napier, 10.92 miles, with a lease of the Sheffield & Tuscumbia River from Sheffield to Tuscumbia, Ala., 2.67 miles, making a total of 107.5 miles.

NEW YORK, PHILADELPHIA & NORFOLK.—Overdue coupons of the first lien 6 per cent. gold bonds of this company to the amount of $1,005,333 are held by the Pennsylvania Railroad and by the Philadelphia, Wilmington & Baltimore, its subordinate line, the same having been purchased by these companies under the terms of the traffic contract dated Sept. 26, 1883, and a formal demand for the payment of these bonds has been made. Since the New York, Philadelphia & Norfolk will not be able to meet this payment, a reorganization of the finances is necessitated, and Rudolph Ellis, Henry W. Biddle and John Lloyd are named the Reorganization Committee. The plan contemplates a foreclosure and provides for the reduction of interest on first mortgage bonds and for an assessment of the income bonds, with reduction of the interest thereon, and also for an assessment upon the stock. No person interested will be allowed to participate in the agreement unless his holdings are deposited on or before May 14, and stockholders and holders of income bonds must also deposit the assessments on the same before that date. The plan of reorganization is as follows:

It is intended that under the foreclosure sale, which, unavoidably, will take place, the properties shall be purchased by the Reorganization Committee, who will thereupon organize a new company under the laws of Maryland, or of Virginia, or of both, which shall have an authorized capital of 40,000 shares, of the par value of $50 each. To the extent of $1,714,375 the new stock is to be exchanged for the present stock, upon payment of an assessment of 15 per cent. The balance is to be retained for future use.

A new first mortgage to cover all the property of the company, including the wharves and other terminals at Norfolk, and the floating equipment, is to be created which shall secure 3,000 4 per cent. forty-year gold bonds of the denomination of $1,000. These bonds, to the extent of $2,500,000, will be issued after the formation of the new company.

The holders of the present 6 per cent. first lien bonds are to receive a like amount of these new 4 per cent. bonds with 10 per cent. additional in said first mortgage 4s, or in scrip convertible into said bonds, as a bonus. Interest is to be paid on the present 6 per cent. first lien bonds after July 1, 1898, at the reduced rate, until the time when it shall commence to run on the new 4s.

A second mortgage, covering the same property as that intended to be included in the first mortgage, shall be created, which shall secure 10,000 4 per cent. non-cumulative income bonds of the denomination of $1,000 each.

To secure the success of the reorganization it is proposed to form an underwriting syndicate which will undertake:

First—To take all non-assenting stock and income bonds and to pay the assessments thereon; and to take at par all first mortgage 4 per cent. bonds not exchanged for the present first mortgage 6 per cent. bonds, receiving the 10 per cent. allowance in case of such taking.

Second—To advance the money required for the Norfolk Terminals and the new steamboat, receiving 5 per cent. interest on such advances.

Third—To purchase at par and accrued interest all first mortgage bonds which may be offered for sale pending the carrying out of the reorganization.

This line extends from Delmar, Del., to Cape Charles, Va., 95 miles, with a branch from King's Creek, Md., to Crisfield, 17 miles, making a total of 112 miles. The company also operates 36 miles of ferry between Cape Charles, Old Point Comfort, Portsmouth and Norfolk. It was chartered in 1881 as successor to the Peninsular Railroad Co. of Virginia. The company had a traffic agreement until January, 1895, with the Pennsylvania Railroad Co. under which that company set aside 10 per cent. of the gross earnings from the interchange traffic to purchase first mortgage coupon bonds. This contract was not renewed on its expiration. The capital stock is $1,714,375. The funded debt consists of $1,848,000 first mortgage 6 per cent. 40-year gold coupon bonds due Jan. 1, 1923, and $1,000,000 income mortgage 6 per cent. non-accumulative 50-year bonds due Oct. 1, 1933.

NEW YORK, SUSQUEHANNA & WESTERN.—Holders of over a majority of the preferred and common stock of this company have accepted the offer of the Erie to exchange on the basis given last week, and notice is given that such offer will be terminated on April 11. Stock must be deposited with J. P. Morgan & Co., New York.

PENNSYLVANIA.—Holders of $2,109,000 Erie & Pittsburgh consolidated 7 per cent. bonds, maturing July 1, are notified that the Pennsylvania Railroad Co. will purchase the same on a 3 per cent. basis until May 1 at their office, in Philadelphia, Pa.

PEORIA, DECATUR & EVANSVILLE.—The first mortgage bonders' committee, of which Walston H. Brown is Chairman, advertises the payment of interest after April 1 at the rate of 5 per cent. per annum on the certificates representing first mortgage bonds deposited with the committee. This is the second coupon so far paid. The last was paid Oct. 1, 1897. The receivership of the road is held by the second mortgage bondholders, who have so far delayed foreclosure proceedings by payment of coupons of the first mortgage bonds, the last of which was paid Dec. 29, 1897. (Jan. 28, p. 72.)

TENNESSEE CENTRAL.—The sale of this narrow gage road running from Spring City, Tenn., northwest to Jewett, 12 miles, to C. O. Godfrey for $20,000, was confirmed by Chancellor McConnell at Dayton, Tenn., April 2. This road was chartered Aug. 20, 1880, as the Tennessee & Sequatchee Valley, to run from Tennessee River to Nashville, Tenn., 140 miles. It was purchased by the present corporation in December, 1883. The road has not been operated for some time. It is understood that it is to be equipped and operated. The general office is at Spring City.

TEXAS CITY TERMINALS.—A suit between this company and the Missouri, Kansas & Texas extending over a long period has been settled in a compromise judgment which has been entered as a lien on the Texas City Terminal's property until paid. This result is stated by an official of the Texas City Terminals to be very satisfactory to all interested in the suit. The Texas City Terminals comprises 4½ miles main line and 3 miles of sidings, making a total of 7½ miles. It handles the business of all railroad companies that connect with it at Texas City Junction on an agreed division of a through rate. J. L. Greatsinger, President and General Manager of the Duluth & Iron Range, of Duluth, Minn., is the owner of the company. Statement is made that a new company has been organized to succeed the Texas City Terminals.

TOLEDO, ST. LOUIS & KANSAS CITY.—United States Circuit Judge William H. Taft, at Toledo, Ohio, has entered a decree for the sale of this road at Toledo at a date not fixed, the upset price being $7,500,000. Hiram D. Peck, of Cincinnati, Ohio, and William Van Buren, of Indianapolis, Ind., are appointed Special Masters to sell the property. This decree is entered in behalf of the first-mortgage bondholders, and the preferred stockholders insist

that they are still entitled to an appeal on the grounds that the bonds are invalid and the stock has a prior right. (Jan. 14, p. 36.)

UNION PACIFIC.—This company took possession at midnight, March 31, of the Kansas Pacific and Denver Pacific, the receiverships of these roads terminating at that time.

Holders of Kansas Pacific Denver extension first mortgage bonds are notified that, by reason of defaults on and since Nov. 1, 1894, of the interest of these bonds, a majority of the holders have elected, pursuant to the provisions of said mortgage, the principal of the bonds become immediately due and payable. Payment of the principal and defaulted coupons, with interest to April 15, amounting to $1,261.97 on each bond, is being made at the office of the United States Trust Co., 45 Wall St., New York.

Holders of Union Pacific 5 per cent. collateral trust bonds under the indenture of April 2, 1883, are notified that the New England Trust Co., trustee, Boston, Mass., is prepared to pay the sum of $878.89 on account of principal of each of these bonds, with interest on the same from June 1, 1897. (April 1, p. 248.)

Equipment trust bonds, Series B, due April 1, with the coupons thereon, are being paid at the office of the Union Pacific Co., 120 Broadway, New York.

Holders of first mortgage bonds dated Aug. 10, 1869, of the Denver Pacific Railway & Telegraph Co., are notified that William D. Cornish, Special Master, is prepared to pay the same, with the interest to date, at the office of the Mercantile Trust Co. of New York, on or after May 10.

UNION PACIFIC, DENVER & GULF.—Announcement is made that this company has obtained control of the Colorado Central 7 per cent. first-mortgage bonds ($4,788,000 outstanding), which were held by the Union Pacific, and a speedy reorganization of the Union Pacific, Denver & Gulf is now looked for.

WEST VIRGINIA & PITTSBURGH.—The coupons due April 1 on the bonds of this company are unpaid. The road was leased Jan. 1, 1890, to the Baltimore & Ohio, which guarantees an interest on the bonds and applies 37½ per cent. of the gross earnings to this purpose. The funded debt consists of $4,000,000 first mortgage 5 per cent. 100-year gold coupon bonds due April 1, 1990, and $58,100 equipment mortgage 6 per cent. notes. The first mortgage bonds are secured on the entire road and equipment of the company.

Electric Railroad News

BROOKLYN, N. Y.—The gross earnings Brooklyn Rapid Transit Co. are reported as follows:

March—	1898.	1897.
Passenger earnings, B. H. R. R. & B. Q. Co. & S. R. Rs.	$449,938.00	$390,481.78
Other earnings from operation	16,449.66	17,278.57
Gross earnings	$466,387.66	$407,760.35
Nine months ending March 31, 1898—		
Passenger earnings, B. H. R. R. & B. Q. Co. & S. R. Rs.	$3,916,919.65	$3,734,484.26
Other earnings from operation	156,851.28	162,833.20
Gross earnings	$4,073,770.93	$3,897,317.46

BUFFALO, N. Y.—The stockholders of the Buffalo, Hamburg & Aurora Railway Co. voted an increase of capital stock from $250,000 to $400,000. (March 18, p. 209.)

MAHANOY CITY, PA.—The Westinghouse Electric & Mfg. Co. filed a bill praying that the Equitable Trust Co. of Philadelphia, as trustee, be required to take possession of and operate the Lakeside Electric Railway Co. and apply the net income to unpaid interest on $14,500 of bonds issued by the railroad company and held by the plaintiff. The appointment of a receiver is also asked for. The Lakeside Electric Railway is operated between Mahanoy City and Shenandoah. The unpaid interest, it is stated, amounts to $1,846.36.

MUSCATINE, IOWA.—Press reports state that the Muscatine Street Railroad & Lighting Co. changed hands April 1, the consideration being $200,000. Mr. H. W. Huttig will be General Manager.

READING, PA.—The stockholders of the East Reading Electric Railway Co. voted in the affirmative on the supplemental lease of a section of the company's line, from Nineteenth St. and Perkiomen Ave. to the intersection of the Friedensburg road, to the Reading Traction Co. The lease is for 99 years at 5 per cent., and 1,400 shares were voted. The line occupies the Reading and Perkiomen turnpike, and was built last year for better service by the United Traction Co. (successor of the Reading Traction Co.) to Carsonia Park.

ROCKAWAY (L. I.), N. Y.—The Rockaway Village Street Railway was bought by the Long Island Railroad at foreclosure sale for $10,000.

WASHINGTON, D. C.—Mr. Henry A. Griswold and Mr. Benjamin S. Minor were appointed receivers of the Anacostia & Potomac River Railroad Co. Mr. Griswold was President of the road.

TRAFFIC.

Traffic Notes.

The Welland Canal will not be opened until the first week in May.

The conference in Buffalo last week to discuss the Pacific Coast passenger rate war came to no conclusion. Another meeting will be held in New York about April 15.

The Fitchburg Railroad took out of Boston last week a "personally conducted" excursion party of 500 passengers bound for Washington over the Delaware & Hudson, the West Shore and the Pennsylvania roads.

The Railroad Commissioners of North Carolina have ordered that after April 30 2,000-mile tickets must be sold for $40 each, and 1,000-mile tickets for $25 each, tickets to be good for any person on any train. The order seems to apply only to the Atlantic Coast Line, the Seaboard Air Line and the Southern Railway.

Dispatches from Omaha indicate that the Nebraska State Board of Transportation has doubts of its power under the law to order a reduction of freight rates, and the Attorney General of the State has gone to Washington to see if he can get the Supreme Court to reopen the case in which the Newberry freight rate law was recently declared invalid.

It was given out at Galveston last week that the Lone Star Steamship Company would continue its competition with the other water lines to New York, notwithstanding the decision adverse to the company in the United States Circuit Court of Appeals; and a tariff was announced based on a first class rate of 25 cents from New York to Galveston. A few days later it was announced in New York that the Lone Star line had stopped receiving freight, the ostensible reason being that the danger of war between this country and Spain made it expedient to keep the vessels in port.

The Pullman and the Wagner sleeping car companies have announced an advance of about 40 per cent. in the rates for berths in compartment cars. Cars of this kind are now running between New York and Chicago, Cincinnati and Chicago, and Chicago and St. Paul. As each section is partitioned off from all the rest of the car it is found that upper berths are not so readily disposed of, except where two berths are desired by passengers traveling together. Between New York and Chicago, where the rate has hitherto been $5, the same as for berths in common sleeping cars, the new rate will be $7.

Members of the Interstate Commerce Commission took testimony in St. Paul last week concerning alleged secret cutting of rates on flour and grain sent eastward from Minneapolis and St. Paul. Clerks of several large shippers were examined and also freight officers of some of the railroads. The evidence given, as reported in the local papers, may or may not show that illegal rates have been made, and the hearing has been adjourned to May 26; but railroad officers seen by the reporters after the hearing say that the testimony brought out gives clews to other important evidence which probably will show extensive rate cutting.

The Postmaster General has awarded to B. C. Richardson of Seattle the four-year contract for carrying mails between Juneau and Weare, Alaska, the annual compensation being $56,000. The length of the route is 1,618 miles, and two round trips a month are to be made. At the price named the rate is 72 cents a mile. The contractor obligates himself to provide supply and relief stations, reindeer and dogs. The contract also calls for Laplanders, carriers and dog teams in sufficient number to insure regularity of service. The principal intermediate points on the route are Dawson City and Forty Mile, Canada, and Circle City, Alaska. The Canadian Government has consented to the establishment of necessary supply stations on Canadian territory.

About 2,500 sober Dunkards, emigrating to North Dakota, passed through St. Paul on Thursday of last week. These emigrants came from Pennsylvania, West Virginia and other Eastern States and from Iowa and Missouri. Not all of these passengers traveled over the same road. The Wisconsin Central delivered in St. Paul on one day two passenger trains containing 30 cars and four freight trains containing 79 cars. Mr. Max Bass, Immigration Agent of the Great Northern, is credited with having secured most of these emigrants. He took out 350 Dunkards in 1894; 465 the next year, and 1,036 in 1896. In 1897 there was a still larger number. During that year the new settlers took up 400,000 acres of Government land, and much additional land was bought from older settlers.

The floods in Ohio and Indiana last week caused the most serious and widespread interruption of railroad traffic that has been experienced in that region for many years, and some of the roads are reported to have had the worst delays from this cause that they ever experienced. The Pittsburgh, Cincinnati, Chicago & St. Louis was reopened for through business on March 30 after a suspension of nearly or quite five days. The business of this road was kept moving over the Pittsburgh, Fort Wayne & Chicago during the interruption. The Cleveland, Akron & Columbus was interrupted about five days. The Wheeling & Lake Erie resumed traffic on March 30. The Cleveland, Lorain & Wheeling resumed business on the 29th. The Ohio River Railroad suffered severely, one report stating that its losses would amount to over $200,000. Through trains were suspended from March 23 to April 1. The Baltimore & Ohio resumed the running of through trains on March 28, though between Zanesville and Newark the line of another company had to be used. The Baltimore & Ohio Southwestern resumed trains the same day, making a detour around the washouts at Chillicothe. The Cincinnati, Hamilton & Dayton resumed the running of through passenger trains on the 26th.

Passenger Travel from Kansas Eastward.

The proposition to shorten the time of certain passenger trains between Kansas City and Chicago leads a passenger man of the former city to the following reflections:

"With many more people here, there is nothing like the amount of travel to Chicago and St. Louis that there was from five to ten years ago. It is amazing to reflect that this should be so, but I find a reason for it. Primarily merchants here, and west of here, have as good a market to buy in as they can get in Chicago. There is no excuse for the country merchant to go East of Kansas City, and he does not go. Kansas City is as near to the manufacturer for any number of lines of commerce. Even pleasure trips are falling off. Kansas people who hailed from Eastern States no longer go to the old home, perhaps because the folks back there are dead or the ties that bind are not so strong. Increasing years, too, retard their movements, and their own children care less for Indiana and the old folks there than they do to come to Kansas City and see the place."

Interstate Commerce Commission.

The Interstate Commerce Commission has announced its decision in the case of Savannah Freight Bureau against the Charleston & Savannah. The opinion is by Chairman Knapp. Passenger fares on the C. & S. between Savannah and points in South Carolina exceed the combined state rates now in force, but most of them, including the fare between Savannah and Charleston, are less than the sum of state rates in effect prior to the South Carolina statute of March 9, 1896, which limits passenger fares in that state to 3¼ cents a mile. The interstate fare between Savannah and Charleston is equal to 3.826 cents a mile. Round trip tickets between Savannah and Charleston, limited to ten days, are sold for $7, or about 3 cents a mile. The conditions governing local passenger traffic in South Carolina on this road and those applying on the interstate passenger service between Savannah and Charleston are substantially dissimilar. The Commission decides that the Federal statute contains no provision under which interstate fares must necessarily be reduced because the South Carolina mileage rate was lowered by the state act of March 9, 1896, or be varied according to a different mileage rate which may be fixed by the state Commission; and that the interstate passenger fares are not unlawful upon the evidence in this case.

Chicago Traffic Matters.

Chicago, April 6, 1898.

During the past week the Interstate Commerce Commission sat in Chicago and heard evidence in three cases of rate violation of more or less importance, but left the city without making any inquiry concerning the cutting of eastbound rates. The commission heard arguments in the case of the Texas Cattle Dealers' Association against nearly all the western lines, alleging the exaction of excessive terminal charges at the Stock Yards here. Notwithstanding a previous decision of the commission, the roads have gone on collecting the $2 charge. Evidence in the old complaint of the Iowa Grain Association was taken, this association having a claim against all the lines in northwestern Iowa for excessive charges on grain. The complainants in this case made the further complaint that grain shippers were being discriminated against in favor of the shippers of live stock from that portion of the country. Before leaving the city, one of the commissioners stated that the commission might return some time in May and begin an investigation into the shipments of the Leiter wheat, which was taken to the Atlantic seaboard at extremely low rates in utter disregard of the interstate act.

The Western Trunk Line committee has taken the place of the defunct Western Joint Traffic Bureau. C. A. Parker has been elected chairman, C. L. Wellington, vice chairman, and H. L. Shute, treasurer; and H. H. Courtright, the other of the four old commissioners, has been chosen as the representative of the western lines on the joint rate committee, of which Mr. Blanchard, of the Joint Traffic Association, is the other member. A rate committee was created, under the new agreement, to meet monthly for the purpose of checking rates. There is no division of the territory of the association among the different commissioners.

When the Santa Fe puts in its reduced tariff on the 8th inst. on packing house products and dressed beef, it will make some important changes in the regulations governing these shipments. The minimum weight of a carload of dressed beef will be 25,000 lbs., instead of 20,000 lbs., and of packing house products 30,000, instead of 24,000, thus compelling shippers to load more nearly to the full capacity of cars. Further than this the mileage allowed the packers on their cars will be reduced from 1 cent a mile to 6 mills.

No change has taken place in the passenger rate war on Alaska business, the Canadian Pacific road still holding out for differentials that the western lines will not agree to.

The Atchison will continue its two fast California trains in service until June 1.

James Charlton, General Passenger Agent of the Alton, is now chairman of the executive committee of the Western Passenger Association.

The attempt to reorganize the Southwestern Passenger Association has failed because the Missouri, Kansas & Texas refuses to agree to redeem at tariff rates all of its tickets which may be found in the hands of brokers.

Some friction has arisen between the railroads and the sleeping car companies over the advance of 40 per cent. in rates on compartment cars, and the advance has not yet been put in force west of Chicago, because the Chicago, Milwaukee & St. Paul operates its own sleeping cars and refuses to increase the compartment rates.

Lines in the Central Passenger Association are having trouble with summer tourist rates because of the ruling of the Joint Traffic managers eliminating Pittsburgh as a summer tourist point.

The Lake Michigan Car Ferry Company began business for the season yesterday between South Chicago and Peshigo. A tariff has been issued, showing rates to St. Paul and Minneapolis ranging from 5 cents on first class, to 1½ cents on fifth class traffic.

All western passenger rates are becoming greatly demoralized as the result of the war over Alaska rates. California passengers buy to North Pacific Coast points on account of the low rates and the direct lines find it almost impossible to get business.

Commencing Tuesday, April 21, the through "Sunset Limited" train running between Chicago and San Francisco, by way of the Chicago & Alton, St. Louis, Iron Mountain & Southern, Texas & Pacific and Southern Pacific, will run only once a week each way. It will leave Chicago Tuesday of each week.

Lake navigation opened April 1, and on Friday and Saturday 17 vessels left the Chicago River with cargoes, a majority of the boats being loaded with grain for Buffalo. About 15 vessels left the Calumet harbor at the same time. The start was made unusually early this year, April 15, and May 1 having been heretofore the usual dates for the opening of navigation to both Chicago ports.

Eastbound shipments from Chicago and Chicago junctions to points at and beyond the Western termini of the trunk lines for the week ending March 31 amounted to 194,064 tons, as compared with 192,901 tons the preceeding week. This statement includes 103,606 tons of grain, 29,988 tons of flour and 19,934 tons of provisions, but no live stock. The following is the statement in detail for the two weeks:

Roads.	Week Ending March 31. Tons.	P. C.	Week Ending March 24. Tons.	P. C.
Baltimore & Ohio	16,722	8.6	16,225	8.4
C., C., C. & St. L.	11,912	6.1	23,935	12.4
Erie	20,863	10.7	18,550	9.6
Grand Trunk	17,389	9.0	13,946	7.2
L., S. & M. S.	34,080	17.6	30,069	15.6
Michigan Central	31,954	16.5	33,057	17.1
N. Y. C. & St. L.	20,355	10.5	19,909	10.3
Pitts., C., C. & St. L.	6,217	3.2	10,696	5.6
Pitts., Ft. Wayne & Chi.	22,647	11.2	18,656	9.7
Wabash	11,923	6.1	7,858	4.1
Totals	194,064	100.0	192,901	100.0